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OF  
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- 1911 COMSTOCK, Prof. J. H., *Cornell University, Ithaca, New York, U.S.A.*
- 1894 FOREL, Professor Auguste, M.D., *Yvorne, Canton de Vaud, Switzerland.*
- 1925 GESTRO, Prof. R., *Direttore del Museo Civico di Storia Naturale, Genova, Italy.*
- 1926 HORVATH, Dr. Geza, *Museum Nationale Hungaricum, Budapest, Hungary.*
- 1915 † HOWARD, Dr. L. O., *Ex-Chief, Bureau of Entomology, U.S. Dept. of Agriculture, Washington, U.S.A.*
- 1914 LAMEERE, Professor A., *74, rue Defarg, Bruxelles, Belgium.*
- 1918 MARCHAL, Dr. Paul, *45, rue de Verrières, Antony, Seine, France.*
- 1913 SEMENOFF TIAN-SHANSKI, A. P., *Vassili Ostrov, 8 lin., 39, Leningrad, U.S.S.R.*
- 1911 WASMANN, Fr. Erich, S.J., *Valkenburg (L.) Ignatius Kolleg, Holland.*
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#### SPECIAL LIFE FELLOWS.

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Election.

- \*1930 (1886) ATMORE, E. A., *2A, Queen's St., Kings Lynn.*
- 1926 (1891) FROHAWK, F. W., *Essendene, Cavendish-road, Sutton, Surrey.*
- 1923 (1889) JOHNSON, The Rev. W. F., M.A., *Roxboro' Terrace, Rostrevor, Co. Down, Ireland.*
- 1929 (1920) † MELDOLA, Mrs. Ella Frederica, *6, Brunswick-square, W.C.1.*
- 1926 (1890) NEWSTEAD, Prof. R., M.Sc., F.R.S., A.L.S., Hon. F.R.H.S., *St. Mary's Cottage, 67, Handbridge, Chester.*
-

## FELLOWS.

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Marked † have compounded for their Annual Subscriptions.

Marked ‡ have been formally admitted into the Society (to Dec. 1930).

Date of  
Election.

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 1902 ‡ ADKIN, B. W., "*Highfield*," *Penbury, Tunbridge Wells.*  
 1885 ‡ ADKIN, Robert (V.-PRES., 1922, 1928; COUNCIL, 1901-2, 1911-13, 1921-3, 1927-9), *Hodeslea, Meads, Eastbourne.*  
 1921 ALEXANDER, Prof. C. P., *Fernald Hall, Massachusetts Agricultural College, Amherst, Mass., U.S.A.*  
 1920 ‡ ALTSON, A. M., 91, *St. James' Mansions, Eloff St., Johannesburg, S. Africa.*  
 1924 ‡ AMIRTHALINGAM, C.  
 1911 ANDERSON, T. J., *Box 323, Nairobi, Kenya Colony.*  
 1919†† ANDREWES, Dr. C. H., 32, *Ossulton-way, N. 2.*  
 1910†† ANDREWES, H. E. (COUNCIL, 1920-2), 8, *North-grove, Highgate, N. 6.*  
 1922 ‡ ANDREWES, H. L., *The Warren, Bere Regis, Wareham, Dorset.*  
 1899 ‡ ANDREWS, Henry W. (COUNCIL, 1930- ), 6, *Footscray-road, Eltham, S.E. 9.*  
 1901 ‡ ANNING, William, 15, *Arthur-street West, E.C. 4.*  
 1908 † ANTRAM, Charles B., *c/o Hongkong and Shanghai Banking Corporation, P.O. Box 158, Calcutta, India.*  
 1930 ARMSTRONG, K. F., *Magdalen College, Oxford.*  
 1927 ‡ ARMSTRONG, R. R., B.A., M.D., B.Ch., 3A, *Newsted-road, Lee, S.E. 12.*  
 1913 ‡ ARMYTAGE, Edward O., *c/o The Westminster Bank, Ltd., 25, Sussex-place, S.W. 7.*  
 1907 ‡ ARNOLD, G., D.Sc., A.R.C.S., *Rhodesia Museum, Bulawayo, South Africa.*  
 1899†† ARROW, G. J. (COUNCIL, 1905-7), 9, *Rossdale-road, Putney, S.W. 15; and British Museum (Natural History), Cromwell-road, S.W. 7.*  
 1922 ARTHUR, Francis, M.R.C.S., L.R.C.P., 395, *Bethnal Green-road, E. 2.*  
 1911 ‡ ASHBY, E. B., 36, *Bulstrode-road, Hounslow, Middlesex.*  
 1907†† ASHBY, Sidney R., 37, *Hide-road, Headstone, Harrow.*  
 1925 ASHWORTH, J. H., *Walton Fold, Longridge, Preston, Lancs.*  
 1921 ATKINSON, D. J., *Ataran Forest Division, Moulmein, Burma.*  
 1927 ‡ ATTIA, R., A.R.C.S., B.Sc., *Plant Protection Section, Ministry of Agriculture, Cairo, Egypt.*  
 1928 ‡ AUBERTIN, Miss D., *British Museum (Natural History), Cromwell-road, S.W. 7.*  
 1930 AUSTIN, M. D., *Dept. of Economic Entomology, South-Eastern Agricultural College, Wye, Kent.*  
 1913 AVINOFF, A., *Carnegie Museum, Pittsburg, U.S.A.*



- 1904†‡BAGNALL, Richard S., D.Sc., F.R.S.E., F.L.S.  
 1909 ‡ BAGWELL-PUREFOY, Capt. Edward, F.Z.S. (COUNCIL, 1930- ), *The Cottage, East Farleigh, Maidstone*.  
 1903-1913, 1924 :  
 ‡ BALDOCK, G. R., *Oakburn Villa, 467, Hertford-road, Enfield Highway*.  
 1916 ‡ BALFOUR, Miss Alice, *Whittingehame, Haddington, Scotland*.  
 1921 ‡ BALFOUR-BROWNE, Prof. W. A. F., F.R.S.E., F.L.S., F.Z.S. (COUNCIL, 1925-7), *Winscombe Court, Winscombe, Somerset*.  
 1912 ‡ BALLARD, E., *Entomological Section, Ministry of Agriculture, Cairo, Egypt*.  
 1890 BARCLAY, Francis H., F.G.S., *The Warren, Cromer*.  
 \*1925 BARNES, W., M.D., *Decatur, Illinois, U.S.A.*  
 1902 ‡ BARRAUD, P. J., *Central Research Institute, Kasauli, Punjab, India*.  
 1907 ‡ BARTLETT, H. Frederick D., *Island of St. Helena, S. Atlantic*.  
 1908 BAYFORD, E. G., 2, *Rockingham-street, Barnsley*.  
 1912 ‡ BAYNES, E. S. A., *Monkshatch Cottage, Compton, Guildford, Surrey*.  
 1896†‡BEARE, Prof. Sir T. Hudson, B.Sc., F.R.S.E. (V.-PRES., 1910; COUNCIL, 1909-11, 1925-7), 10, *Regent-terrace, Edinburgh*.  
 1912 BEDFORD, Gerald, *Division of Veterinary Services, P.O., Ondestepoort, Pretoria, Transvaal*.  
 1913 BEDFORD, Capt. H. W., *W.T.R. Laboratories, Khartoum, Sudan*.  
 1899 ‡ BEDWELL, Ernest C. (V.-PRES., 1922; COUNCIL, 1917-19, 1922-4, 1929-), *Bruggen, Brighton-road, Coulsdon, Surrey*.  
 1920 ‡ BEESON, C. F. C., *Indian Forest Service, Forest Research Institute, Dehra Dun, U.P., India*.  
 1927 ‡ BELL, J. H., *Maiden Lodge, Caterham Valley, Surrey*.  
 1904 BENGTTSSON, Simon, Ph.D., Lecturer, *University of Lund, Sweden*; Curator, *Entomological Collection of the University*.  
 1915 BENHAM, Prof. W. B., M.A., D.Sc., F.R.S., *University of Otago, Dunedin, New Zealand*.  
 1925 ‡ BENSON, R. B., M.A., *British Museum (Nat. Hist.), Cromwell-rd., S.W. 7*.  
 1906 ‡ BENTALL, E. E., *The Grove, Witham, Essex*.  
 1913 ‡ BEST-GARDNER, Charles C.  
 1885 ‡ BETHUNE-BAKER, George T., F.L.S., F.Z.S. (PRES., 1913-14; V.-PRES., 1910-11, 1915; COUNCIL, 1895, 1910-15, 1919-21), 9, *Eversfield-road, Eastbourne*.  
 1929 BEWSHER, Maj. F. W., O.B.E., D.S.O., M.C., F.Z.S., 1st Bn. R. Fusiliers, *Kamptee, C.P., India*.  
 1891 ‡ BLABER, W. H., F.L.S., 34, *Cromwell-road, Hove, Sussex*.  
 1904 ‡ BLAIR, Kenneth G., B.Sc. (COUNCIL, 1918-20), *Claremont, 120, Sunning-fields-road, Hendon, N.W. 4*.  
 1904 ‡ BLISS, M. F., M.C., M.R.C.S., L.R.C.P., *Branston, nr. Rugby*.  
 1903 BOGUE, W. A., 34, *Handen-road, Lee, S.E. 12*.  
 1929 BOLIVAR Y PIeltaIN, Prof. C., *Museo Nacional de Ciencias Naturales, Madrid*.  
 1921 ‡ BOLTON-KING, E., *Christ Church, Oxford*.  
 1902 ‡ BOSTOCK, E. D., *Oulton Cross, Stone, Staffs*.  
 1921 BOUCK, Baron J., *Springfield, South Godstone, Surrey*.  
 1927 BOWHILL, J. W., *Morelands, Grange-loan, Edinburgh*.

- 1894 † BOWLES, E. Augustus, M.A., *Myddelton House, Waltham Cross.*  
 1912 † BOWRING, C. Talbot, *St. Francis, Benfield-way, Portslade, nr. Hove, Sussex.*  
 1921 † BOX, H. E., c/o G.P.O., *St. John's Antigua, Leeward Islands.*  
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 1910 BOYD, A. Whitworth, *Frandle House, nr. Northwich, Cheshire.*  
 1920 BOYD, Major J. E. M., M.C., *The British Military Hospital, Ferozepore, Punjab, India.*  
 1905 BRACKEN, Charles W., B.A., 8, *De la Hay Villas, Plymouth.*  
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 1928 BRADSHAW, Major C. P., *Cavalry Club, Piccadilly, W. 1.*  
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 1894 † BRIGHT, P. M., "Nethercourt," 60, *Christchurch-road, Bournemouth.*  
 1924 † BRINDLEY, Mrs. M. D., 25, *Madingley-road, Cambridge.*  
 1909 † BRITTEN, Harry, 22, *Birch-grove, Levenshulme, Manchester.*  
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 1902 † BROUGHTON, Brig.-Gen. T. D., R.E., *Stone House, Pewsey, Wilts.*  
 1919 BROWN, J. M., B.Sc., F.L.S., 176, *Carterknowle-road, Millhouses, Sheffield.*  
 1910 BROWNE, H. B., M.A., *Kenilworth, Scatcherd-lane, Morley, Yorks.*  
 1909 BRYANT, Gilbert E., 163, *Gloucester-terrace, Hyde Park, W. 2.*  
 1919 † BUCKHURST, A. S., *Pathological Laboratory, Milton-road, Harpenden, Herts.*  
 1930 BUCKNILL, The Rev. E. G., M.A., 234, *The Bluff, Yokohama, Japan.*  
 1925 † BULL, G. V., B.A., M.B., *Whitegables, Sandhurst, Kent.*  
 1907 BULLEID, Arthur, F.S.A., *Dimboro, Midsomer Norton, Somerset.*  
 1929 BURDETT, E. F., 70, *Hamilton-crescent, S. Harrow.*  
 1922 BURNS, A. N., Sugar Experiment Station, *Mackay, N. Queensland, Australia.*  
 1896†† BURR, Malcolm, D.Sc., F.G.S., A.R.S.M. (V.-PRES., 1912; COUNCIL, 1903-4, 1910-12), *United University Club, Pall Mall East, S.W. 1; Trans. to:—Moscow, Petrovskaia Agricultural Academy, Prof. V. F. Boldyrev.*  
 1920 BURRAS, A. E., 3, *Connaught-road, North End, Portsmouth.*  
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 1914 † BUTTERFIELD, R., Curator, *Corporation Museum, Keighley, Yorks.*  
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 1902 † CAMERON, Malcolm, M.B., R.N. (COUNCIL, 1919-20), 15, *Teesdale-road, Leytonstone, E. 11.*  
 1913 † CAMERON, W. P. L., *Gezira Research Farm, Wad Medani, Blue Nile Province, Sudan.*  
 1923 † CAMPBELL-TAYLOR, J. E., *Barclay's Bank House, Pembroke Dock, S. Wales.*  
 1910 CARLIER, E. Wace, M.D., F.R.S.E., *Morningside, Granville-road, Dorridge, Warwickshire, and The University, Birmingham.*



- 1924 ‡ CARLIER, S. E. Wace, *Morningside, Granville-road, Dorridge, Warwickshire.*
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- 1895 ‡ CARPENTER, George H., D.Sc., M.R.I.A., *The Manchester Museum, The University of Manchester.*
- 1915 CARR, Prof. J. W., M.A., F.L.S., F.G.S., Hon. F.R.H.S., Professor of Biology, *University College*, and Director Emeritus of the Public Natural History Museum, *Wollaton Hall, Nottingham.*
- 1912 CARTER, H. F., *The Office of Medical Entomologist, Torrington-square, Colombo, Ceylon.*
- 1906 ‡ CARTER, H. J., B.A., *Garrawillah, Kintore-street, Wahroonga, Sydney, N.S.W.*
- 1921 CASSELS, O. C., D.F.C., N.D.A., *Estancia Las Petacos San Yorge, F.C.C.A., Argentine.*
- 1921 CASTLE, Miss Amy, *Dominion Museum, Wellington, New Zealand.*
- 1921 ‡ CATOR, Douglas, 13, *Westminster-mansions, Gt. Smith-street, S.W. 1.*
- 1889 ‡ CAVE, Charles J. P.
- 1920 ‡ LE CERF, F., Curator of Lepidoptera in the Paris Museum, 13, *rue Guy de la Brosse, Paris.*
- 1930 CHAMPERNOWNE, A. M., c/o Lloyds (Cox and Kings Br.), *Pall Mall, S.W.1.*
- 1914 ‡ CHAMPION, H. G., M.A., *Forest Research Institute, Dehra Dun, U.P., India.*
- 1919 CHATTERJEE, N. C., B.Sc., *Forest Research Institute, Dehra Dun, U.P., India.*
- 1923 CHATTERJEE, S. N., *Forest Research Institute, Dehra Dun, U.P., India.*
- 1897 ‡ CHAWNER, Miss Ethel F., *Tarrystone House, Cookham, Berks.*
- 1913 ‡ CHEAVIN, W. H. S., F.C.S., F.R.M.S., 19, *Rosendale-road, W. Dulwich, S.E. 21.*
- 1919 CHEESMAN, Miss L. Evelyn, c/o *The British Resident, Civil Commissioner, Vila, Efate, New Hebrides.*
- 1920 ‡ CHEETHAM, C. A., *Austwick, via Lancaster.*
- 1889 CHRISTY, William M., M.A., F.L.S., *Watergate, Emsworth.*
- 1909 CLARK, Lt.-Col. C. Turner, F.Z.S., *The Hutch, Shirley Warren, Southampton.*
- 1923 CLARKE, C. E., 51, *King Edward-road, Dunedin, New Zealand.*
- 1929 CLARKSON, Miss Lucy I., *Apipucos, Recife (Pernambuco), Brazil.*
- 1914 ‡ CLEARE, L. D., Jr., *Department of Agriculture, Georgetown, British Guiana.*
- 1922 CLUTTEN, Wm. George, 136, *Coal Clough-lane, Burnley.*
- 1908 CLUTTERBUCK, Charles G., *Heathside, 23, Heathville-road, Gloucester.*
- 1908 CLUTTERBUCK, Sir Peter H., *Pensbury, Walton-on-Thames.*
- 1904 ‡ COCKAYNE, E. A., M.A., M.D., F.R.C.P. (COUNCIL, 1915-17, 1926-28), 116, *Westbourne-terrace, W. 2.*
- 1920 COCKCROFT, T., 111, *Owen-street, Wellington South, New Zealand.*
- 1917 ‡ COCKERELL, Prof. T. D. A., *University of Colorado, Boulder, Colorado, U.S.A.*
- 1914 COLEMAN, Leslie C., *Dept. of Agriculture, Bangalore, Mysore, India.*
- 1922 ‡ COLLENETTE, C. L., *Gothic Lodge, Woodford Green, Essex.*
- 1899 ‡ COLLIN, James E. (PRESIDENT, 1927-8; V.-PRES., 1913, 1923, 1929; COUNCIL, 1904-06, 1913-15, 1923-25, 1929), *Raylands, Newmarket.*
- 1918 COMSTOCK, Dr. J. A., c/o *Los Angeles Museum, Exposition Park, Los Angeles, California, U.S.A.*
- \*1929 COOK, W., *Dept. of Agriculture, Aburi, Gold Coast, B.W.A.*

- 1924 ‡ COOKE, Brig.-Gen. B. H., C.M.G., C.B.E., D.S.O., *Inniscrone, Datchet, Bucks.*
- 1926 COOPER, Mrs. J. OMER, B.A., 23, *Leazes-terrace, Newcastle-on-Tyne.*
- 1921 COOTE, F. D., 71, *Fenchurch-street, E.C. 3.*
- 1924 CORBETT, G. H., 576, *Gardens Hill, Kuala Lumpur, F.M.S.*
- 1916 CORNFORD, The Rev. Bruce, 43, *Havelock-road, Portsmouth.*
- 1921 ‡ CORPORAAL, J. B., *Zoological Museum, Plantage Middenlaam, Amsterdam.*
- 1924 ‡ COTT, Hugh B., M.A., F.R.P.S., *The Elms, Elmlea-avenue, Stoke Bishop, Bristol.*
- 1923 COTTAM, R., *Entomological Dept., Wellcome Tropical Research Laboratory, Khartoum, Sudan.*
- 1920 ‡ COTTERELL, G. S., A.R.C.S., *Agricultural Dept., Aburi, Gold Coast.*
- 1928 COVELL, Major G., I.M.S., M.D., *Malaria Survey of India, Kasauli, Punjab, India.*
- 1913 COWARD, T. A., F.Z.S., 36, *George-street, Manchester.*
- 1923 ‡ COX, L. G., 9, *Chichester-terrace, Brighton.*
- 1920 ‡ CRABBE, E., 52, *Sarsfield-road, Balham, S.W. 12.*
- 1895 CRABTREE, B. H., *Holly Bank, Alderley Edge, Cheshire.*
- 1919 CRAMPTON, Prof. G. Chester, *Massachusetts Agricultural College, Amherst, Mass., U.S.A.*
- 1922 ‡ CRAWFORD, Wm. Monod, B.A., *Orissa, Marlborough-park, Belfast.*
- 1928 ‡ CREWDSON, R. C. R., *The Grange, Delamere, Northwich, Cheshire.*
- 1919 ‡ CUMMING, B. D., *Whistman's Wood, West Clandon, Surrey.*
- 1927 CUNLIFFE, N., M.A., D.Sc., *The School of Rural Economy, University of Oxford.*
- 1908 ‡ CURTIS, W. P., *Drake North, Sandringham-road, Parkstone, Dorset.*
- 
- 1930 DAINTREE, A. C., *P.O. Box 797, Lourenço Marques, Portuguese East Africa.*
- 1929 ‡ DALTRY, H. W., *Bar Hill, Madeley, nr. Crewe.*
- 1928 DAMPF, Dr. A., Chief Government Entomologist, *Avenida Insurgentes, 171, Mexico, D.F., Mexico.*
- 1911 DAVEY, H. W., *Cobungua, 19, Moama-road, E. Malvern, Australia.*
- 1913 ‡ DAVIDSON, James, D.Sc., F.L.S. (COUNCIL, 1922-4), *Waite Agricultural Research Institute, Glen Osmond, University of Adelaide, S. Australia.*
- 1930 DAVIES, W. M., B.Sc., Ph.D., *University College of N. Wales, Memorial Buildings, Bangor.*
- 1903 DAY, F. H., 26, *Currock-terrace, Carlisle.*
- 1898 DAY, G. O., *Sahlatston, Duncan's Station, Vancouver Island, British Columbia.*
- 1923 DEAN, J. D., *Heathwaite, Heath Park-avenue, Cardiff.*
- 1930 DESHPANDE, V. G., M.Ag., *Dept. of Agricultural Zoology, 10, George-square, Edinburgh.*
- 1923 DEWAR, D. A., M.B., C.M., *Altyre House, Stanley, S.O., Co. Durham.*
- 1930 DIBB, J. R., 45, *King George Avenue, Chapel Allerton, Leeds.*
- 1917 ‡ DICKSEE, Arthur, 24, *Lyford-road, Wandsworth Common, S.W. 18.*
- 1925 DIGGES, Rev. T. G., M.A., *Glooncahir, Mohill, Co. Leitrim, N. Ireland.*



- 1929 ‡ DINNAGE, H., *Stable Cottages, Lower Beeding, Horsham.*
- 1887 ‡ DIXEY, Frederick Augustus, M.A., M.D., F.R.S., Fellow of Wadham College (PRES., 1909-10; V.-PRES., 1904-5, 1911; COUNCIL, 1895, 1904-6), *Wadham College, Oxford.*
- 1921 DOBSON, H. W., 14, *Finkle-street, Kendal.*
- 1909 † DOBSON, Thomas, 33, *The Park, Sharples, Bolton.*
- 1905 DODD, Frederick P., *Kuranda, via Cairns, Queensland.*
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- 1914 DE LA TORRE BUENO, J. R., 38, *De Kalb-avenue, White Plains, New York, U.S.A.*
- 1928 ‡ TOTTENHAM, Rev. C. E., 18, *Tyrone-road, Thorpe Bay, Essex.*
- 1927 TOWNSEND, A., *Leam Grange, Warwick New-road, Leamington Spa.*
- 1906 ‡ TULLOCH, Brig.-Gen. J. B. G., C.B., C.M.G., *Hill-court, Abergavenny, Monmouthshire.*
- 1895 ‡ TUNALEY, Henry, *Castleton, Searle-road, Farnham.*
- 1910 TURATI, Conte Emilio, 4, *Piazza S. Alessandro, Milan, Italy.*
- 1930 ‡ TURK, F. A., F.Z.S., 18, *Fernside-road, Balham, S.W. 12.*
- 1898 ‡ TURNER, A. J., M.D., *Wickham-terrace, Brisbane, Australia.*
- 1893 ‡ TURNER, Henry Jerome, F.R.H.S. (V.-PRES., 1930; LIBRARIAN, 1921-9 COUNCIL, 1910-12, 1930), *Latemar, West Drive, Cheam, Surrey.*
- 1923 ‡ TWIDLE, A., N.S.A., *The Rowans, Godstone Green, Surrey.*



- 1893 ‡ URICH, F. W., C.M.Z.S., 107, *Frederick-st., Port of Spain, Trinidad, B.W.I.*  
 1920 ‡ UVAROV, B. P., c/o *Imperial Institute of Entomology, British Museum (Natural History), S. Kensington, S.W. 7.*
- 1923 ‡ VALENTINE, A., *Grand Hotel, Herne Bay, Kent.*  
 1922 ‡ VAN SOMEREN, V. G. L., C.M.Z.S., Box 658, *Nairobi, Kenya Colony.*  
 1924 ‡ VAN STRAUBENZEE, Brig-Gen. Casimir C. H., C.B., C.B.E., 6, *Sussex Mansions, Sussex-place, S.W. 7.*  
 1904†† VAUGHAN, W.  
 1914 ‡ VEITCH, Robert, B.Sc., *Dept. of Agriculture, Brisbane, Australia.*
- 1897 ‡ WAINWRIGHT, C. J. (COUNCIL, 1901, 1912-14), 172, *Hamstead-road, Handsworth, Birmingham.*  
 1918 WALFORD, L. J., *The Cavalry Club, Piccadilly, W.*  
 1878 ‡ WALKER, J. J., M.A., R.N., F.L.S. (PRESIDENT, 1919-20; V.-PRES., 1916, 1921; SEC., 1899, 1905-1918; COUNCIL, 1894, 1921), *Aorangi, Lonsdale-road, Summertown, Oxford.*  
 1921 WALKER, S., 53, *Micklegate Hill, York.*  
 1928 WALSH, Mrs. H. S., *Societeits Straet, 5, Soekaboemi, Java.*  
 1919 ‡ WARD, J. Davis, *Limehurst, Grange-over-Sands, Lancs.*  
 1910 ‡ WARD, John J., *Natura, Woodland-avenue, Coventry.*  
 1908 ‡ WARREN, B. C. S., 14, *Avenue de l'Eglise Anglaise, Lausanne, Switzerland.*  
 1901 ‡ WATERHOUSE, G. A., D.Sc., B.E., *Allowrie, Stanhope-road, Killara, New South Wales, Australia.*
- \*1923 ‡ WATERS, Prof. E. G. R., M.A., 184, *Woodstock-road, Oxford.*  
 \*1914 ‡ WATERSTON, James, B.D., D.Sc. (COUNCIL, 1920-2), *British Museum (Natural History), S. Kensington, S.W. 7.*
- 1921 WATKINSON, The Rev. G., M.A., *Woodfield, Hipperholme, nr. Halifax.*  
 1918 WATSON, J. H., 70, *Ashford-road, Withington, Manchester.*  
 1914 WATT, MORRIS N., M.B., Ch.B., F.R.M.S., *Pathology Dept., Medical School, Dunedin, New Zealand.*
- 1923 ‡ WEST, Lieut.-Col. R. M., M.D., D.S.O., O.B.E., *Wootton Bridge, Isle of Wight.*  
 1906 ‡ WHEELER, The Rev. George, M.A., F.Z.S. (SECRETARY, 1911-21; V.-PRES., 1914; COUNCIL, 1921), *Ellesmere, Gratwicke-road, Worthing.*  
 1910 ‡ WHITE, E. Barton, M.R.C.S., *The Mental Hospital, Fishponds, Bristol.*  
 1918 WHITE, Ronald Senior, *Central Research Institute, Kasauli (Simla Hills), India.*
- 1930 WHITEHOUSE, Prof. Beckwith, 62, *Hagley-road, Birmingham.*  
 1923 ‡ WHITFIELD, F. G. S., *Wellcome Tropical Research Laboratories, Entomological Field Station, Talodi, Kordofan, Sudan.*  
 1913†† WHITLEY, P. N., *Brantwood, Halifax*; and *New College, Oxford.*  
 1921 ‡ WHITNEY, W. B., Ph.D., A.M.Inst.C.E., *Glen Doone, Bull-lane, Gerrard's Cross, Bucks.*  
 1913 ‡ WHITTAKER, Oscar, F.R.M.S., 1143, *Esquimalt Avenue, Hollyburn, British Columbia.*

1911-1920, 1925 :

- ‡ WHITTINGHAM, Rt. Rev. A. G., Lord Bishop of St. Edmundsbury and Ipswich, *The Bishop's House, Ipswich*.
- 1917 ‡ WICKHAM, Rev. Prebendary A. P., *East Brent Vicarage, Highbridge, Somerset*.
- 1926 ‡ WIGGLESWORTH, V. B., M.A., M.D., B.Ch., "*Hedgeside*," *Holtspur End, Beaconsfield, Bucks*.
- 1923 WIGHTMAN, A. J. C., *Aurago, Pulborough, Sussex*.
- 1922 ‡ WILKINSON, D. S., *c/o Imperial Institute of Entomology, British Museum (Natural History), Cromwell-road, S.W. 7*.
- 1923 WILKINSON, Harold, *Dept. of Agriculture, Nairobi, Kenya*.
- 1911 ‡ WILLIAMS, C. B., M.A., 29, *Queens-crescent, Edinburgh*.
- 1915 WILLIAMS, H. B., LL.D., *Littledene, Clairmont-lane, Esher, Surrey*.
- 1921 ‡ WILLMER, E. Nevill, *Trafford Hall, near Chester*.
- 1922 WILSON, F. E., "*Cyathea*," *Ferncroft-avenue, E. Malvern, Victoria, Australia*.
- 1919 † WILSON, Lt.-Col. R. S., *Army and Navy Club, Pall Mall, S.W.*
- 1915 WINN, A. F., 32, *Springfield-avenue, Westmount, Montreal, Canada*.
- 1928 WINTER, A. E., 148, *West End Avenue, Harrogate*.
- 1926 ‡ WOMERSLEY, H., 26, *Marita-rd., Claremont, Perth, W. Australia*.
- 1928 ‡ WOOD, Hugh, *Rollrights, Milford-on-Sea*.
- 1919 ‡ WOOD, H. Worsley, 37, *De Freville Avenue, Cambridge*.
- 1927 WOOD, R. C., *P.O. Zomba, Nyasaland*.
- 1905 WOODBRIDGE, F. C., *Briar Close, Latchmore-avenue, Gerrard's Cross S.O., Bucks*.
- 1925 WOODCOCK, A. J. A., M.Sc., *Clifton Manor, York*.
- 1925 ‡ WOODWARD, Capt. G. C., R.N., *Training Ship "Cornwall," Denton, nr. Gravesend, Kent*.
- 1921 WOOLETT, G. F. C., *Sipilang, Province Clarke, B.N. Borneo*.
- 1926 ‡ DE WORMS, C. G. M., *Milton Park, Egham, Surrey*.
- 1922 WRIGHT, A. E., *Burnleigh, Kent Bank-road, Grange-over-Sands*.
- 1927 ‡ WRIGHT, W. Rees, M.Sc., *Dept. of Zoology, The University of Manchester*.
- 1926 ‡ WYATT, C. W. fford, 14, *Cavendish-square, W. 1*.
- 1925 ‡ EL ZOHEIRY, M. Soliman, *Plant Protection Service, Ministry of Agriculture, Cairo, Egypt*.

## ADDITIONS TO THE LIBRARY

DURING THE YEAR 1930.

- ACHARD (JULIEN). *Fragments entomologiques*. pp. 156. 8vo. Prague (—Bruxelles), 1922—(1926).  
Pp. 145–156 appeared as a supplement to “*Bull. Ann. Soc. ent. Belg.*” 65, 1925, after the author's death. *Purchased.*
- ACHETA DOMESTICA (M. E. S.). *Episodes of Insect life*.  
[Wanting.]
- Edited and revised by the Rev. J. G. Wood. pp. xv + 430, text illust. (col.). 8vo. London, 1879. *Purchased. Carnegie Grant.*
- ALAMO (ROBERTO). *Dos Insectos perjudiciales al cultivo del Algodonero, el Gusano de la Hoja y el Gusano de la Bellota. Descripcion y procedimientos de control*. pp. 60, 4 pls. 8vo. Caracas, 1925.  
Ministerio de Fomento. *Mr. H. E. Box.*
- ALEXANDER (C. P.). *Diptera of Patagonia and South Chile. Pt. 1. Craneflies*. 8vo. 1929.  
*See BRITISH MUSEUM (Natural History).*
- AMANS (J. F. ST.). *See SAINT-AMANS (J. F.).*
- ANDERSON (ERNEST) and SPRY (FRANK PALMER). *Victorian Butterflies and how to collect them*. pp. 129 + [iii], text illust. 8vo. Melbourne, 1893–1894.  
Issued in two parts. The index to part 1 is paged 79–80, thus duplicating the use of these page-numbers. *Purchased. Carnegie Grant.*
- ANDRÉ (ERNEST). *Les Fourmis*. pp. iv + 345 + [i], text illust. 8vo. Paris, 1885.  
*Bibliothèque des Merveilles. Purchased. Carnegie Grant.*
- ASSMUSS (EDUARD PHILIBERT). *Symbola ad faunam Mosquensem Enumeratio Lepidopterorum in gubernio mosquensi indigenorum. Fasciculus I. Macrolepidoptera †*. pp. xii + 56. 8vo. Lipsiae, 1858.  
Printed in double column. *Purchased. Carnegie Grant.*
- AUCHER-ELOY (P. M. R.). *See E. (R. A.), i.e. AUCHER-ELOY (P. M. R.).*
- AUDINET-SERVILLE (JEAN GUILLAUME) [1775–1858]. *Faune Française ou histoire naturelle, générale et particulière des animaux qui se trouvent en France. Insectes Coléoptères*. pp. 240 †. 8vo. Paris [1829–1830].  
Livrs. 1–2 are of the second issue. The first issue appeared in 1820. *Purchased. Carnegie Grant.*
- AUDOUIN (JEAN VICTOR and others. *Les Insectes. See CUVIER (G. L. C. F. D.). Le Règne Animal, &c. [Third Edition]. Vol. vi. 4to. [1836–1849.]*
- AURIVILLIUS (C.). *Svensk Insektfauna. [Orthoptera, Coleoptera, and Hymenoptera.] 8vo. 1913–1918. See STOCKHOLM.—Entomologiska Föreningen. Svensk Insektfauna.*
- BEDÉL (LOUIS). *Catalogue raisonné des Coléoptères de Tunisie. Première partie CICINDELIDAE-STAPHYLINIDAE*. pp. xiv + 130. 8vo. Paris, 1900.  
*Exploration scientifique de la Tunisie publiée sous les auspices du Ministère de l'Instruction publique. Purchased. Carnegie Grant.*
- BEFFA (G. DELLA). *I Coleotteri italiani nocivi alle piante coltivate. Sistematico, biologia, agraria. Fasc. 1. I Cerambici*. pp. 1–68. †  
Appendici . . . *Rivista Coleotterologica Italiana. Anno 13. 8vo. Salsomaggiore, 1915. Purchased. Carnegie Grant.*
- BERGE (F.). *Schmetterlingsbuch oder allgemeine und besondere Naturgeschichte der Schmetterlinge, mit besonderer Rücksicht auf die europäischen Gattungen*. pp. i + viii + 142, 48 pls. col. 4to. Stuttgart, 1842. *Purchased.*
- BERLAND (LUCIEN) and FAGE (L.). *Les Arachnides de France par Eugène Simon. Tome 6, pt. 2. Œuvre posthume publiée par L. Berland et L. Fage*. 8vo. 1926. *See SIMON (EUGÈNE), 1875–1926. Purchased. Carnegie Grant.*
- BERLIN.—*Deutsche Entomologische Gesellschaft, E. V. Mitteilungen, &c., Jahrgang 1–. 8vo. Berlin, 1930–. The Society.*



- BERLIN.—Zoologisches Museum der Universität. Mitteilungen. Bd. 15-. 4to. Berlin 1929-.  
*The Museum.*
- BLANCHARD (CHARLES ÉMILE) and others. Les Insectes. See CUVIER (G. L. C. F. D.). Le Règne Animal, &c. [Third Edition.] Vol. vi. 4to. [1836-1849.]
- BLANKAART (STEPH.). Schou-berg der Rupsen, Wormen, Mäden, en vliegende Dierkens daar uit voortkomende. pp. [vi] + 232 + [ii], 22 pls. Sm. 8vo. Amsterdam, 1688.  
*Purchased. Carnegie Grant.*
- BOGDANOV-KATJKOV (N. N.). Kitchen garden and truck pests in the Union of Soviet Socialistic Republics. pp. 18. 4to. Leningrad, 1928.  
*Dr. Jordan.*
- BOISDUVAL (J. B. A. D. DE). Faune Entomologique de Madagascar, Bourbon et Maurice. Lépidoptères . . . avec des notes sur les mœurs par M. Sganzin. pp. 122, 16 pls. col. 4to. Paris, 1833.  
*Purchased. Carnegie Grant.*
- BOLETIN DE LA SOCIEDAD ENTOMOLOGICA ARGENTINA. See BUENOS AIRES.—Sociedad Entomologica Argentina.
- BREYNIUS (J. P.). J. P. Breynii . . . Historia naturalis Cocci radicum tinctorii, &c. pp. [xii] + 22 [2], 2 pls. (col.). 4to. Gedani, 1731.  
*Purchased. Carnegie Grant.*
- BRITISH MUSEUM (Natural History). Diptera of Patagonia and South Chile, based mainly on material in the . . . Museum. 8vo. London, 1929-.  
Part I. Crane-flies by C. P. Alexander. 1929.  
Part II, fasc. i. PSYCHODIDAE, by A. L. Tonnoir. 1929.  
„ fasc. ii. BLEPHAROCERIDAE, by F. W. Edwards. 1929.  
*The Trustees Brit. Mus. (N.H.).*
- BRITTEN (H.). Histological and illustrative methods for Entomologists, by H. Eltringham . . . with a chapter . . . by H. Britten. 8vo. 1930. See ELTRINGHAM (H.).
- BROWN (THOMAS). The book of Butterflies, Sphinxes and Moths. 2 vols. illust. col. Sm. 8vo. London, 1832.  
This work was also issued as Vol. lxxv, lxxvi of Constable's Miscellany, 1832.
- 2nd. Edit. 3 vols. illust. col. Sm. 8vo. London, 1834.  
In the 2nd Edit. the word "Sphinxes" is altered to "Sphinges."  
*Purchased. Carnegie Grant.*
- BUCHHECKER (HENRY). Systema Entomologiæ sistens insectorum classes, genera, species. pls. col. 8vo. München (1876)-(1880).  
The work appears to be unfinished. The "Prospekt" is dated 1880, but the title to the Odonata section is dated 1876. This copy is bound with 4 wrappers in place. The collation is: Hymenoptera pls. 1-8, Lepidoptera pls. 1-8, 51-58, 1-4, 1-2, 5-30, T. P. Odonata, pp. 1-16, I-IV, pls. [1-4], 5-42.  
*Purchased. Carnegie Grant.*
- BUENOS AIRES.—Ministerio de Agricultura de la Nacion.  
Boletin, &c. Tomo 28-. 4to. Buenos Aires, 1929-.  
*The Department.*
- BUENOS AIRES.—Sociedad Entomologica Argentina.  
Boletin. Volumen 1-. 8vo. Buenos Aires, 1925-.  
*The Society.*
- BULLETIN DE LA SOCIÉTÉ ENTOMOLOGIQUE DE BULGARIE. See SOFIA.—Bulgarische Entomologische Gesellschaft.
- BULLETIN, DEPARTMENT OF AGRICULTURE, CYPRUS. 8vo. 1929-. See CYPRUS.—Department of Agriculture.
- BURR (MALCOLM). A synopsis of the Orthoptera of Western Europe. pp. 160. 8vo. London, 1910.  
Originally published in *Ent. Record*, 1903-1910.  
*Purchased.*
- CAMERON (MALCOLM). The Fauna of British India, including Ceylon and Burmah. Coleoptera: STAPHYLINIDAE, Vol. I. 8vo. London, 1930.  
*Secretary of State for India.*
- CANTENER (L. P.). Histoire Naturelle des Lépidoptères Rhopalocères ou Papillons diurnes, des départemens [sic] des Haut et Bas-Rhin, de la Moselle, de la Meurthe et des Vosges. pp. 166, 39 pls. (col.). 8vo. Paris, 1834.  
Published in 13 livraisons.  
*Purchased. Carnegie Grant.*
- CLEMENS (BRACKENRIDGE). The Tineina of North America . . . being a collected edition of his writings on that group of Insects. With notes by the editor, H. T. Stainton. pp. xvi + 282, text illust. 8vo. London, 1872.  
*Purchased. Carnegie Grant.*
- CLEMENTS (W. G.) and SCHAUS (W.). On a collection of Sierra Leone Lepidoptera. 8vo. 1893.  
See SCHAUS (W.) and CLEMENTS (W. G.).

- COMSTOCK (JOHN HENRY), (ANNA BOTSFORD), and HERRICK (GLENN W.). A manual for the study of Insects. Revised (nineteenth) edition. pp. xiv + 401, 3 pls. (col.), text illust. 8vo. Ithaca, 1930.  
*Presented by the Authors.*
- COSTA (ACHILLE). Degli Insetti che attaccano l'albero ed il frutto dell' Olivo del Ciliegio del Pero del Melo del Castagno e della Vite e le semenze del Pisello della Lenticchia della Fava e del Grano. Loro descrizione e biologia danni che arrecano e mezzi per distruggerli. pp. 100. 10 pls. 4to. Napoli, 1857.  
*Purchased. Carnegie Grant.*
- COTES (E. C.) and SWINHOE (CHARLES). A catalogue of the Moths of India. 7 pts. pp. [vi] + 812. 8vo. Calcutta, 1887-1889.  
Wanting pts. 4-6.  
Issued by the Indian Museum.  
*Presented by Mr. H. J. Turner.*
- CUVIER (G. L. C. F. D.). Third Edition.  
Le Règne Animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée. Edition . . . par une réunion de disciples de Cuvier. Vol. VI [in 4]. Insectes, par Mm. Audouin, Blanchard, Doyère et Milne Edwards. illust. col. 4to. Paris [1836-1849].  
This edition known as the "Disciples edition" was issued in 262 livraisons. A copy in the British Museum (Nat. Hist.) bears the date of receipt of the livraisons, the dates of the publication of the parts being unknown.  
*Purchased. Carnegie Grant.*
- CYPRUS.—Department of Agriculture. Bulletin (Entomological Series). 1-. 8vo. Nicosia, 1929-.  
*Presented by the Department.*
- DALLA TORRE (K. W. VON). Atlas der Alpenflora. Herausgegeben von Deutschen und Oesterreichischen Alpenverein . . . text von Dr. K. W. von Dalla Torre. pp. 251. 8vo. Wien, 1882.  
Wanting the plates.  
*Mr. H. J. Turner.*
- DALLAS (E. D.). Ensayo de una clasificación de los Coleopteros anormales . . . como introducción a la comunicación titulada "Melomelia tarsal en un coleoptero argentino." 8vo. Buenos Aires, 1923.  
*Dr. Jordan.*
- DANIEL (JOSEF). Münchener Koleopterologische Zeitschrift . . . redigirt . . . von . . . Dr. Josef Daniel. Bd. 1-3†. 8vo. 1902-1908. *See MUENCHENER KOLEOPTEROLOGISCHE ZEITSCHRIFT.*
- DANIEL (KARL). Münchener Koleopterologische Zeitschrift . . . redigirt . . . von Dr. Karl Daniel, &c. Bd. 1-3†. 8vo. 1902-1908. *See MUENCHENER KOLEOPTEROLOGISCHE ZEITSCHRIFT.*
- DANMARKS FAUNA. Illustrerede haandbøger over den danske Dyreverden. [The Insect parts only.] 22 Vols.  
*Purchased. Carnegie Grant.*
- DERENNE-MEYERS (F.). Faune de la Belgique. Classification des Géométrides. pp. 107. 8vo. Bruxelles, 1929.  
*The Author.*
- DEUTSCHE ENTOMOLOGISCHE GESELLSCHAFT. *See BERLIN.*
- DISCONZI (FRANCESCO). Entomologia vicentina ossia catalogo sistematico degli Insetti della provincia di Vicenza; con osservazioni e descrizioni di moltissime specie degli insetti utili e dei nocivi, &c. Fasc. 1-3†. pp. 316, 18 pls. 8vo. Padova, 1865.  
*Purchased. Carnegie Grant.*
- DOVER (CEDRIC). [List of] Publications: 1921-20. 4 pp. fol. [n.d.]  
*The Author.*
- DOYÈRE (LOUIS) [1811-1863] and others. Les Insectes. *See CUVIER (G. L. C. F. D.). Le Règne Animal, &c. [Third Edition]. Vol. VI. 4to. [1836-1849.]*
- DRUCE (HAMILTON H.). Illustrations of African LYCAENIDAE; being photographic representations of type specimens contained in the Imperial Zoological Museum at Berlin. pp. 34, 8 pls. 8vo. London, 1910.  
Printed on one side of the paper.  
*Purchased. Carnegie Grant.*
- E. (R. A.), *i.e.* AUCHER-ELOY (P. M. R.). L'Entomologie, ou l'histoire naturelle des Insectes enseignée en 15 leçons, contenant les principes élémentaires de cette science, l'histoire des mœurs et des métamorphoses des insectes, la méthode de classification de Geoffroy, et une méthode analytique à l'aide de laquelle on peut seul, et en quelques minutes, connaître le nom générique de tous les insectes connus. pp. 437 + [ii], 9 pls. 8vo. Paris, 1827.  
*Purchased. Carnegie Grant.*
- EDWARDS (F. W.). Diptera of Patagonia and South Chile. Pt. II, fasc. ii. BLEPHAROCERIDAE *See BRITISH MUSEUM (Natural History). 8vo. 1929.*
- EDWARDS (HENRI MILNE) and others. Les Insectes. *See CUVIER (G. L. C. F. D.). Le Règne Animal, &c. [Third Edition]. Vol. VI. 4to. [1836-1849.]*
- ELOY (P. M. R. AUCHER-). *See E. (R. A.), i.e. AUCHER-ELOY (P. M. R.).*

- ELTRINGHAM (HARRY). Histological and illustrative methods for Entomologists . . . with a chapter on mounting whole insects by H. Britten. pp. xii + 139, text illust. 8vo. Oxford, 1930. *The Author.*
- ENTOMOLOGISCHES NACHRICHTENBLATT. Organ für Entomologie und Entomologische hilfsmittel herausgegeben von Emmerich Reitter. Bd. 1-. 1927-. 8vo. Troppau, 1927. *The Editor.*
- EVERTS (ED.). Coleoptera Neerlandica. De Schildvleugelige Insekten van Nederland en het aangrenzend gebied. Deel 1-3. 8vo. 's Gravenhage, 1898-1922. Deel 1 is prefaced by a supplement on life-histories and collecting. *Purchased. Carnegie Grant.*
- FAGE (L.) and BERLAND (LUCIEN). Les Arachnides de France par Eugène Simon. Tome 6, pt. 2. Œuvre posthume publiée par L. Berland et L. Fage. 8vo. 1926. See SIMON (EUGÈNE), 1875-1926.
- FLORENCE.—Reale Museo di Fisica e Storia Naturale. Catalogo della collezione di Insetti Italiani del R. Museo di Firenze. Serie 1-2. Coleotteri. [By A. Targioni Tozzetti.] pp. xii + 1-36, 31-62. 8vo. Firenze, 1876-1879. Pt. 1 is paged 1-36 and pt. 2 commences at p. 31. *Purchased. Carnegie Grant.*
- FRENCH (G. H.). The Butterflies of the Eastern United States. For the use of classes in Zoology and private students. pp. 402, text illust. 8vo. Philadelphia, 1886. *Purchased. Carnegie Grant.*
- FRIESE (H.). Die APIDAE (Blumenwespen) von Argentinien nach den Reisenresultaten der Herren A. C. Jensen-Haarup und P. Jorgenson in den Jahren 1904-1907. pp. [iv] + 111 + [iv]. 8vo. Silkeborg, 1908. Pages 95-111 contain three papers by A. C. Jensen-Haarup, *q.v.* *Purchased. Carnegie Grant.*
- FRISCH (JOHANN LEONHARD) [1666-1787]. Beschreibung von allerley Insecten in Teutsch-Land, nebst nützlichen Anmerkungen und nöthigen Abbildungen von diesem Kriechenden und Fliegenden Inlandischen Gewürme, &c. 13 Thl. 4to. Berlin, 1720-1738. Each part has a separate dated title-page. There are indexes to Thl. 1-5, 6-10, 11-13, at the end of Thl. 5, 10, and 13 respectively. *Purchased. Thl. 11-12.*
- GEER (C. DE). Des Herrn Baron K. Degeer . . . Abhandlungen zur Geschichte der Insekten, . . . übersetzt . . . von J. A. E. Gotze. 7 Thl. & Atlas. (in 11). 8vo. Nürnberg, 1778-83. *Purchased. Carnegie Grant.*
- GRAY (JOHN EDWARD). The Zoological Miscellany. 8vo. 1831. See ZOOLOGICAL MISCELLANY.
- GRIFFINI (A.). Lepidotteri Italiani. pp. viii + 238, text illust. 8vo. Milano, 1895. A list of entomological works by the author is appended. *Manuali Hoepli. Entomologia ii. Purchased. Carnegie Grant.*
- GRUVEL ( ). Essai sur l'histoire naturelle du Chili, par M. l'Abbé Molina; traduit de l'Italien, et enrichi de notes, par M. Gruvel. 8vo. 1789. See MOLINA (G. I.).
- HENNEGUY (L. FÉLIX). Les Insectes. Morphologie, Reproduction, Embryogénie. Leçons recueillies par A. Lécaillon et G. Poirault. pp. xviii + [i] + 804, 4 pls. col., text illust. Lge. 8vo. Paris, 1904. *Purchased. Carnegie Grant.*
- HERING (MARTIN). Die Ökologie der blattminierenden Insektenlarven. pp. iv + 254, 2 pls. (col.), text illust. 8vo. Berlin, 1926. *Purchased. Zool. Bausteine, 1, hft. 2. 1926.*
- HERR (A.). Anleitung die deutschen Schmetterlinge auf eine leichte und sichere Art durch eigene Untersuchung zu bestimmen. pp. x + 456 + [i], 2 pls. (col.). 8vo. Frankfurt a.M., 1833. Also forms "Anleitung die Schmetterlinge und Raupen, &c. Abt. 1. Die deutschen Schmetterlinge." *Purchased. Carnegie Grant.*
- HERRICH-SCHAEFFER (GOTTLIEB AUGUST WILHELM) [1799-1874]. Nomenclator entomologicus. Verzeichniss der europäischen Insekten; zur Erleichterung des Tauschverkehrs mit Preisen versehen. Heft 1-2 (in 1 Vol.). 8vo. Regensburg, 1835-1840. The second Heft is in 2 parts. This copy has been interleaved and annotated. *Purchased. Carnegie Grant.*
- HERRICK (GLENN W.) and others. A manual for the study of Insects. Nineteenth edition. 8vo. 1930. See COMSTOCK (J. H.), (A. B.), and HERRICK (G. W.). 1930.
- HEYWOOD (HORTENSE BUTLER) and NEEDHAM (JAMES G.). A handbook of the Dragonflies of North America. 8vo. 1929. See NEEDHAM (J. G.) and HEYWOOD (H. B.).
- HOULBERT (C.). Les Insectes. Anatomie et Physiologie générales. 2<sup>e</sup> ed. Paris. n.d. Encyclopédie Scientifique. *Purchased. Carnegie Grant.*



- ILLIGER (JOHANN CARL WILHELM) [1775-1813]. Abbildungen zu Karl Illiger's Uebersetzung von Olivier's Entomologie . . . Käfer. 2 Thl. 4to. 1802-03. See STURM (J.).
- IMHOFF (LUDWIG) and LABRAM (J. DAVID). Die Schweizerischen Käfergattungen, &c. Sm. 8vo. [1848-1852]. See LABRAM (J. D.) and IMHOFF (L.).
- IMPERIAL BUREAU OF ENTOMOLOGY. A list of Entomologists employed in the British Empire. Prepared for the Third Imperial Entomological Conference. pp. 16. 8vo. London, 1930. *Imperial Bureau of Entomology.*
- IMPERIAL ENTOMOLOGICAL CONFERENCE. Report of the third . . . Conference, 17-27th June, 1930. pp. 59. 8vo. London, 1930. *Imperial Institute of Entomology.*
- JAHN (ALFREDO). Esbozo de las Formaciones geológicas de Venezuela. pp. 108, 1 map col., illust. 4to. Caracas, 1921. *Mr. H. E. Box.*
- JENSON-HAARUP (A. C.). Biological Researches amongst the Argentine Bees, with special reference to flowers they visit. 8vo. 1908.  
Forms pp. 95-107 of "Friese (H.) Die APIDAE (Blumenwespen) von Argentina," q.v. *Purchased. Carnegie Grant.*
- JENSON-HAARUP (A. C.). Two new Argentine species of APIDAE. 8vo. 1908.  
Forms pp. 107-108 of "Friese (H.) Die APIDAE (Blumenwespen) von Argentina," q.v. *Purchased. Carnegie Grant.*
- JENSON-HAARUP (A. C.). *Hoffmansceggia falcaria*, Cav., and its visitors amongst Bees. 8vo. 1908.  
Forms pp. 108-111 of "Friese (H.) Die APIDAE (Blumenwespen) von Argentina," q.v. *Purchased. Carnegie Grant.*
- KIRBY (WILLIAM) and SPENCE (WILLIAM). An introduction to Entomology: or elements of the Natural History of Insects. 4 vols. illust. col. 8vo. London, 1815-1826.  
Vol. I appeared in 1815. Vol. II appeared in 1817.  
Vol. III appeared in 1826. Vol. IV appeared in 1826. *Purchased. Vols. 1-2. Carnegie Grant.*
- KIRBY (W. EGMONT). Butterflies and Moths of the United Kingdom. pp. lii + 468, 70 pls. col. 8vo. London, [n.d.] *Purchased.*
- KIRBY (W. F.). Elementary text-book of Entomology. pp. viii + 240, 87 pls. 8vo. London, 1885.  
———2nd Edition, revised and augmented. pp. viii + 281, 87 pls. 8vo. London, 1892.  
Edit. 1. *Purchased.*  
Edit. 2. *Presented by Mrs. E. R. Banks.*
- KIRCHNER (O. VON). Blumen und Insekten, ihre Anpassungen aneinander und ihre gegenseitige Abhängigkeit. pp. v + 436, 2 pls., text illust. 8vo. Leipzig & Berlin, 1911. *Purchased. Carnegie Grant.*
- KIRKALDY (G. W.). Catalogue of the Hemiptera (Heteroptera); with biological and anatomical references, lists of food-plants and parasites, &c. Prefaced by a discussion on Nomenclature, and an analytical table of families. Vol. I.†. CIMICIDAE. pp. xl + 392. 8vo. Berlin, 1909. *Purchased. Carnegie Grant.*
- KNOCH (AUGUST WILHELM). Beiträge zur Insektengeschichte. Stück 1-3, illust. col. 8vo. Leipzig, 1781-1783. *Purchased. Carnegie Grant.*
- KOHLER (PABLO). Catalogo de Lepidópteros Argentinos. Enumeración sistemática de Lepidópteros diurnos y parte de nocturnos (de SPHINGIDAE hasta Noctuide [sic] (HELIOTHINAE) . . . con colaboración bibliográfica de R. Strassberger. pp. 12. 8vo. Buenos Aires, 1928. *Mr. H. E. Box.*  
Printed in treble column.
- KUHNT (PAUL). Illustrierte Bestimmungs-Tabellen der Käfer Deutschlands. Ein Handbuch zum genauen und leichten Bestimmen aller in Deutschland vorkommenden Käfer. pp. viii + [ii] + 1138, text illust. 8vo. Stuttgart, 1913. *Purchased. Carnegie Grant.*
- LABRAM (J. DAVID) and IMHOFF (LUDWIG). Die Schweizerischen Käfergattungen in Abbildungen nach der Natur. Nach Anleitung und mit Text von . . . L. Imhoff. 34 hfte. Sm. 8vo. Basel [1848-1852].  
136 pls. col. with descriptive letterpress. *Purchased. Carnegie Grant.*
- LATHY (PERCY I.). Thèses Entomologiques (Lépidoptères). Fasc. 1. Notes et Remarques sur les *Agrias*. pp. 25, 10 pls. col. 4to. Paris, 1921.  
This copy is No. 2 of 55 signed and numbered copies issued. It was the author's own copy and has an additional set of proof plates uncoloured. *Mr. P. I. Lathy.*

- LEECH (JOHN HENRY). British Pyralides, including the PTEROPHORIDÆ. pp. viii + 122, 18 pls. col. 8vo. London, 1886. *Mrs. E. R. Bankes.*
- LEVRAT (GUSTAVE). Études entomologiques. Cahier 1. †. pp. 99 + [ii]. Lge. 8vo. Lyon, 1859.  
This work is mainly articles reprinted from scientific Journals. *Purchased. Carnegie Grant.*
- LOTOS, Naturwissenschaftliche Zeitschrift. See PRAGUE.—Deutsche naturwissenschaftlich-medizinische Verein für Böhmen "Lotos."
- LOWE (FREDERICK). Catalogue of Lepidoptera. Vol. I. DANAINÆ. Pt. 1. †. *Danaina*. pp. [ii] + 51. (interleaved). 8vo. London, 1904. *Purchased. Carnegie Grant.*
- LUCAS (H.). Des Papillons. Vade mecum du Lépidoptéroligiste contenant l'histoire naturelle des Insectes qui composent l'ordre des Lépidoptères, leurs mœurs, la manière d'en faire la chasse, de les élever et de les conserver dans les collections. pp. 182, 5 pls. col. 8vo. Paris, 1838.  
A reprint of the article "Papillon" from "Dict. pittoresq. hist. nat. Phénomènes Nat." *Purchased. Carnegie Grant.*
- LUCAS (ROBERT). Catalogus alphabeticus generum et subgenerum Coleopterorum orbis terrarum totius. (famili., trib., subtr., sect. incl.). Pars I. †. 8vo. Berlin [1920]. *Purchased. Carnegie Grant.*
- LUCAS (W. J.). The book of British Hawk-Moths. A popular and practical handbook for Lepidopterists. pp. x + 157, 15 pls., text illust. 8vo. London, 1895. *Purchased. Carnegie Grant.*
- MCCOOK (HENRY C.). The Honey Ants of the garden of the gods, and the Occident Ants of the American plains. pp. 188, 13 pls. 8vo. Philadelphia, 1882. *Purchased. Carnegie Grant.*
- MAINARDI (ATHOS). See RIVISTA COLEOTTEROLOGICA ITALIANA. Direttore A. Mainardi. 8vo. 1915.
- MALO (CHARLES). Les Papillons. pp. x + 198. engr. title. Sm. 8vo. Paris [1816?].  
An almanack for 1818 is printed at the end. Wanting the plates. *Purchased. Carnegie Grant.*
- MARCELLIA. Revista internazionale di Cecidologia. Redattore A. Trotter. Vol. 1-8, 10, 23, 25. 8vo. (Padova)-Avellino, 1902. *Purchased. Carnegie Grant.*
- MARTORELL Y PEÑA (MANUEL). Catálogos sinonimicos de los Insectos encontrados en Cataluña, aumentados con los recientemente hallados por el Autor, en los diversos órdenes, &c. pp. 201. 8vo. Barcelona, 1879.  
Printed in double column. *Purchased. Carnegie Grant.*
- MARTYN (THOMAS) [fl. 1760-1816]. Psyche. Figures of nondescript Lepidopterous Insects or rare Moths and Butterflies from different parts of the world.—Figures des Insectes Lépidoptères, &c. 32 pls. col. on vellum. 8vo. London, 1797.  
Wanting the text. This copy consists of Title-page, 32 pls. col., on vellum. According to Sherborn, 1898, Ann. Mag. Nat. Hist. (7) 1: 106, this work was limited to 10 copies and a census is given. This copy is not included in the 10 referred to above, and since it bears the following note "Thomas Martin recd. 30 guineas for this Copy as he lately assured me . . . May 25. 1799," it is possibly the author's own copy from which the 10 copies were made. Pl. 1 bears a pencil note which appears to read "Sett A." *Deposited on loan by Mr. R. W. Lloyd.*
- MAYNARD (CHARLES J.). A manual of North American Butterflies. pp. iv + 226, 10 pls. col., text illust. 8vo. Boston, 1891. *Purchased. Carnegie Grant.*
- MEDICUS (WILHELM). Illustriertes Schmetterlings- und Raupenbuch. Anleitung zur Kenntniss der Schmetterlinge und Raupen, nebst Anweisung zur praktischen Anlage von Sammlungen. 5te Auflage. pp. xiv + 104. 8 pls. col. Sm. 8vo. Kaiserslautern. n.d. *Purchased. Carnegie Grant.*
- MEIGEN (J. W.). Handbuch für Schmetterlingsliebhaber; besonders für Anfänger im Sammeln. pp. iii + 248, 16 pls. 8vo. Aachen, 1827. *Purchased. Carnegie Grant.*
- MEYERS (F. DERENNE-). See DERENNE-MEYERS (F.).
- MILNE EDWARDS (HENRI). See EDWARDS (HENRI MILNE).
- MITTEILUNGEN DER DEUTSCHEN ENTOMOLOGISCHEN GESELLSCHAFT. See BERLIN.
- MITTEILUNGEN AUS DEM ZOOLOGISCHEN MUSEUM IN BERLIN. See BERLIN.—Zoologisches Museum der Universität. 4to. 1929-.
- MITTHEILUNGEN DES MÜNCHENER ENTOMOLOGISCHEN VEREINS. See MUNICH.—Muenchener Entomologischer Verein. 8vo. 1877-1881.

- MOLINA (GIOVANNI IGNAZIO). Essai sur l'histoire naturelle du Chile par M. l'Abbé Molina; traduit de l'Italien et enrichi de notes par M. Gruvel. pp. xvi + 351. 8vo. Paris, 1789. *Purchased. Carnegie Grant.*
- MOORE (FREDERIC). Lepidoptera Indica. By F. Moore (and [continued after his death by] C. Swinhoe). 10 vols. illust. col. 4to. London, 1890-1913. Vols. 3-10. *Purchased. Carnegie Grant.*
- MUENCHENER KOLEOPTEROLOGISCHE ZEITSCHRIFT. Organ für allgemeine Systematik der Koleopteren und für die Koleopteren-fauna der paläarktischen Region. Gegründet, redigirt und herausgegeben von Dr. Karl Daniel und Dr. Josef Daniel. Bd. 1-3†. 8vo. München, 1902-1908. *Purchased. Carnegie Grant.*
- MÜNCHENER KOLEOPTEROLOGISCHE ZEITSCHRIFT. See MUENCHENER KOLEOPTEROLOGISCHE ZEITSCHRIFT.
- MUNICH.—Entomologische Gesellschaft, e.v. Mitteilungen der Münchener Entomologischen Gesellschaft, Jahrgang 2-5, 7-11. 8vo. München, 1911-1914, 1916-1921. Wanting Jahrgang, 1, 6. 1910, 1915. *The Society.*
- MUNICH.—Muenchener Entomologischer Verein. Mitteilungen, &c. Jahrgang 1-5. 8vo. München, 1877-1881. *Purchased. Carnegie Grant.*
- MYERS (J. G.). Insect Singers. A natural history of the Cicadas. pp. xx + 304, 8 pls., text illust. 8vo. London, 1929. *The Author.*
- NEAVE (S. A.). A summary of data relating to Economic Entomology in the British Empire. Prepared for the Third Imperial Entomological Conference. pp. 23 + [ii]. 8vo. London, 1930. *Imperial Bureau of Entomology.*
- NEEDHAM (JAMES G.) and HEYWOOD (HORTENSE BUTLER). A handbook of the Dragonflies of North America. pp. viii + 378, text illust. 8vo. Springfield, &c., 1929. *Purchased.*
- OCHSENHEIMER (FERDINAND). Die Schmetterlinge Sachsens, mit Rücksichten auf alle bekannte europäische Arten. Theil 1.†. Falter, oder Tagschmetterlinge. pp. vi + 493. 8vo. Dresden & Leipzig, 1805. *Purchased. Carnegie Grant.*
- OKEN (LORENZ) [1779-1851]. Allgemeine Naturgeschichte für alle Stände. 7 Bd. [in 13]. 8vo. Stuttgart, 1833-41.  
 Bd. i. Mineralogie und Geognosie, bearbeitet von . . . F. A. Walchner. 1839.  
 „ ii-iii, Abth. 3. Botanik. 1839-41.  
 „ iv-vii. Thierreich. 1833-38.  
 ———— Universal Register, &c. pp. 468. 8vo. Stuttgart, 1842.  
 ———— Abbildungen, &c. 164 pls. col., with descriptive text. fol. Stuttgart, 1843. *Purchased. Carnegie Grant.*
- OLIVIER (GUILLAUME ANTOINE) [1756-1814]. Abbildungen zu Karl Illiger's Uebersetzung von Olivier's Entomologie . . . Käfer 2 Thl. 4to. 1802-03. See STURM (J.).
- OYARZÚN (AURELIANO). Las Agallas de la *Colliguaya odorifera*, Mol. *Exurus colliguayae*, Philippi, o sea: *Tetrastichus colliguayae*, Philippi, de Gahan [sic, err. pro GAHAN] traducido del ingles por el G. Ebel. pp. 14. 8vo. Santiago de Chile, 1928. *The Author.*
- OYARZÚN (AURELIANO). Materias colorantes de los tegumentos de los insectos. pp. 14. 8vo. Santiago de Chile, 1928. *The Author.*
- PAINE (R. W.) and others. The Coconut Moth in Fiji. 8vo. 1930. See TOTHILL (J. D.) and others.
- PENNINGTON (MILES STUART). Lista de los Hemipteros Heteropteros de la República Argentina. Primera parte, PENTATOMOIDEA-COROIDEA. †. pp. 47. 8vo. Buenos Aires, 1920. Printed in double column. *Mr. H. E. Box.*
- PETIVER (JAMES). J. Petiveri Opera, historiam naturalem spectantia; or Gazophylacium, &c. 2 vols. illust. fol. London, 1764. *Purchased Carnegie Grant.*
- PIOGER (L. M.). Les Insectes, leurs métamorphoses, leur structure et leurs mœurs. pp. xxviii + 529, text illust., front. 8vo. Paris, 1882. *Purchased. Carnegie Grant.*
- PITTIER (H.). Esbozo de las Formaciones vegetales de Venezuela con una breve reseña de los productos naturales y agrícolas. pp. 44. 4to. Caracas, 1920. *Mr. H. E. Box.*
- POIRAULT (G.) and LÉCAILLON (A.). Les Insectes . . . par L. Félix Hennequy leçons recueillies par A. Lécaillon and G. Poirault. 8vo. 1904. See HENNEQUY (L. FÉLIX).
- PORTA (ANTONIO). See RIVISTA COLEOTTEROLOGICA ITALIANA . . . direttore A. Porta. 8vo. 1903-1914.



- PRAGUE.—Deutsche naturwissenschaftlich-medizinische Verein für Böhmen "Lotos." Naturwissenschaftliche Zeitschrift Lotos. Band 76-. 1928-. 8vo. Prag, 1928-.  
The Society.
- PRAGUE.—Národního Musea.—Entomologické oddělení. Sborník (-Acta, Bulletin, Schriften, Periodical), Vol. 5-. 4to. Prazě, 1927.  
The Section.
- PRIESNER (H.). Die Thysanopteren Europas. pp. 755, 4 pls. 8vo. Wien, 1928.  
Purchased. Carnegie Grant.
- REITTER (EMMERICH). See ENTOMOLOGISCHES NACHRICHTENBLATT. Herausgegeben von E. Reitter. Bd. 1-. 8vo. 1927-.
- RIPFON (R. H. F.). Icones Ornithopterorum: a monograph of the Papilionine tribe Troides of Hubner, or Ornithoptera (Bird-wing Butterflies) of Boisduval. 2 vols. illust. col. fol. London, [1890-] 1898-1906 [-10].  
Purchased. Carnegie Grant.
- RIVISTA COLEOTTEROLOGICA ITALIANA. Organo mensile per la sistematica generale dei Coleotteri. Direttore Antonio Porta (—Athos Mainardi). Anno 1-13 no. 9. †. 8vo. Camerino, Salsomaggiore, 1903-1915.  
Wanting Anno 3, no. 8-11; 4, no. 1.  
Purchased. Carnegie Grant.
- SAINT-AMANS (JEAN FLORIMOND BOUDON DE) [1748-1831]. Philosophie entomologique, . . . suivi de l'exposition des methodes de Geoffroi, et de celle de Linné combinée avec le système de Fabricius, &c. pp. viii + 152 + 108bis, + [i]. 8vo. Agen. An vii. [1799].  
Purchased. Carnegie Grant.
- SAUNDERS (EDWARD). A collection of the papers and notes published by E. Saunders in "Ent. Mon. Mag.," 1-36, 1864-1900. 241 pp. 8vo. 1864-1900.
- SBORNIK ENTOMOLOGICKÉHO ODDĚLENÍ NÁRODNÍHO MUSEA V PRAZE. See PRAGUE.
- SCHÄFFER (G. A. W. HERRICH-). See HERRICH-SCHAEFFER (G. A. W.).
- SCHAUS (WILLIAM) and CLEMENTS (W. G.). On a collection of Sierra Leone Lepidoptera. pp. vi + 46, 3 pls. col. 8vo. London, 1893.  
Purchased. Carnegie Grant.
- SCHENKLING (SIGMUND) and SCHMIDT (R.). Nomenclator coleopterologicus. Eine etymologische Erklärung sämtlicher Gattungs- und Artnamen der Käfer der deutschen Fauna sowie der angrenzenden Gebiete. 2te Auflage. pp. iv + 255. 8vo. Jena, 1922.  
The 1st Edition appeared in 1894.  
Purchased. Carnegie Grant.
- SCHMIDT (RICHARD) and SCHENKLING (S.). Nomenclator Coleopterologicus. 2te Auflage. 8vo. 1922. See SCHENKLING (S.) and SCHMIDT (R.).
- SCHMITZ (HERMANN). Revision der Phoriden, nach forschungsgeschichtlichen und nomenclatorischen, systematischen und anatomischen biologischen und faunistischen Gesichtspunkten. pp. [iv] + 212, 2 pls., text illust. 4to. Berlin, &c., 1929.  
Printed in double column.  
Mr. F. W. Edwards.
- SCHREITER (RODOLFO). Observaciones biológicas sobre las especies Tucumanas de los géneros *Dysdaemonia*, *Rothschildia* y *Copaxa*. pp. 17, 11 pls. 4to. Buenos Aires, 1925. Universidad Nacional de Tucumán. Museo de Historia Natural. Mr. H. E. Box.
- SÉGUY (E.). Histoire Naturelle des Moustiques de France. Étude systématique et biologique des Moustiques de l'Europe centrale et septentrionale et de leurs parasites. pp. 225, text illust. Sm. 8vo. Paris, 1923.  
Encyclopédie Pratique du Naturaliste, xiv.  
Purchased. Carnegie Grant.
- SÉGUY (E.). Les Insectes parasites de l'homme et les animaux domestiques. pp. 422, text illust. Sm. 8vo. Paris, 1924.  
Encyclopédie Pratique du Naturaliste, xvii.  
Purchased. Carnegie Grant.
- SÉNAC (H.). Essai monographique sur le genre *Pimelia* (Fabricius). 2 pts. pp. xx + 106, xvi + 160. 8vo. Paris, 1884-1887.  
Purchased. Carnegie Grant.
- SEURAT (L. G.). Faune des Eaux Continentales de la Berbérie. pp. 66. 8vo. Alger, 1921. Travaux du Laboratoire de Zoologie appliquée Université d'Alger.  
Mr. F. J. Griffin.
- SEURAT (L. G.). Observations sur les limites, les facies et les associations animales de l'étage intercotidal de la petite Syrte (Golfe de Gabès). pp. 72, 1 map. 8vo. Tunis, 1924. Notes et Mémoires, Station Océanographique de Salammbô, No. 3.  
Mr. F. J. Griffin.
- SGANZIN (VICTOR). Faune Entomologique de Madagascar, Bourbon et Maurice. Lépidoptères . . . avec des notes sur les mœurs, par M. Sganzin. See BOISDUVAL (J. B. A. D. DE). 4to. 1833.
- SHUCKARD (WILLIAM E.) and SWAINSON (WILLIAM). On the history and Natural Arrangement of Insects. See SWAINSON (W.) and SHUCKARD (W. E.). 8vo. (1840).

- SIMON (EUGÈNE). Les Arachnides de France. 7 tom. 8vo. 1875-1926.  
Wanting Tome 1. Tome 6, pt. ii, was published posthumously by L. Berland and L. Fage.  
*Purchased. Carnegie Grant.*
- SOFIA.—Bulgarische Entomologische Gesellschaft. Mitteilungen (—Bulletin), Bd. iv—. 8vo. Sofia, 1928—.
- SOWERBY (JAMES). English Botany; or coloured figures of British Plants, &c. Third edition . . . by J. T. B. Syme, &c. 12 vols. illust. col. 8vo. London, 1863-1886.  
*Purchased. Carnegie Grant.*
- SPENCE (WILLIAM) and KIRBY (WILLIAM). An introduction to Entomology. 8vo. 1815-1826.  
*See KIRBY (W.) and SPENCE (W.).*
- SPRY (FRANK PALMER) and ANDERSON (ERNEST). Victorian Butterflies, &c. 8vo. 1893-1894.  
*See ANDERSON (E.) and SPRY (F. P.).*
- STANTON (H. T.). The Tineina of North America. 8vo. 1872. *See CLEMENS (B.).*
- STRASSBERGER (RICARDO). Catalogo de Lepidópteros Argentinos . . . por P. Kohler con colaboración . . . de R. Strassberger. 8vo. 1928. *See KOHLER (PABLO).*
- STRECKER (FERDINAND HEINRICH HERMAN). Butterflies and Moths of North America . . . a complete synonymical Catalogue of Macrolepidoptera with a full bibliography, &c. pp. [ii] + ii + 283, 2 pls. 8vo. Reading, Pa., 1878.  
*Purchased. Carnegie Grant.*
- STURM (JACOB). Abbildungen zu Karl Illiger's Uebersetzung von Olivier's Entomologie oder Naturgeschichte der Insekten mit ihren Gattungs- und Artmerkmalen ihrer Beschreibung und Synonymie. Käfer 2 Thl. 4to. Nürnberg, 1802-03.  
*Purchased. Carnegie Grant.*
- SWAINSON (WILLIAM) and SHUCKARD (WILLIAM E.). On the history and natural arrangement of Insects. pp. [iv] + 406, text illust. 8vo. London (1840).  
Lardner's Cabinet Cyclopædia Vol. X. *Purchased.*
- SWINHOE (CHARLES) and COTES (E. C.). A Catalogue of the Moths of India. 7 pts. 8vo. 1887-1889. *See COTES (E. C.) and SWINHOE (C.).*
- SWINHOE (CHARLES). Lepidoptera Indica. Vols. 7-10. 4to. 1905-1913. *See MOORE (F.).*
- SYKES (MARK L.). Protective resemblance in the Insecta.  
[Proc. Manchester Field Cl. 1: 183-234, 10 pls., text illust.] 1904.  
*Purchased. Carnegie Grant.*
- TALBOT (G.). A monograph of the Pierine genus *Delias*. Pt. 1—. 4to. London, 1928—. Title from wrapper.  
*Mr. J. J. Joicey.*
- TAYLOR (T. H. C.) and others. The Coconut Moth in Fiji. 8vo. 1930. *See TOTHILL (J. D.) and others.*
- THEOBALD (FREDERICK VINCENT). Insect Life. A short account of the classification and habits of Insects. pp. xi + 235, text illust. 8vo. London, 1896.  
*Purchased. Carnegie Grant.*
- THOMPSON (W. R.). The biological control of Insect and Plant pests. A report on the organisation and progress of the work of Farnham House Laboratory. pp. 124, 8 pls. 8vo. 1930.  
Empire Marketing Board, No. 29. 1930.
- TONNOIR (A. L.). Diptera of Patagonia and South Chile. Pt. II. fasc. 1. PSYCHODIDÆ. 8vo. 1929. *See BRITISH MUSEUM (Natural History).*
- TOTHILL (J. D.) and others. The Coconut Moth in Fiji. A history of its control by means of parasites. By J. D. Tothill assisted by T. H. C. Taylor and R. W. Faine. pp. viii + 269, 34 pls. (col.), 1 map, text illust. Lg. 8vo. London, 1930.  
*Purchased.*
- TOZZETTI (A. TARGIONI). Catalogo della collezione di Insetti Italiani del R. Museo di Firenze. *See FLORENCE.—Reale Museo di Fisica e Storia Naturale.* 8vo. 1876-1879.
- TROTTER (A.). Marcellia . . . Redattore A. Trotter. Vol. 1-8, 10, 23, 25. 8vo. 1902—. *See MARCELLIA.*
- VAL (CAMILLE JACQUELIN DU). *See JACQUELIN DU VAL (CAMILLE).*
- WAGNER (JUL.). Katalog der palaarktischen Aphanipteren. pp. 55. 8vo. Wien, 1930.  
*Purchased.*
- WALCHNER (FRIEDRICH AUGUST). Mineralogie und Geognosie. *See OKEN (L.).—Allgemeine Naturgeschichte für alle Stände.* Bd. 1. 8vo. 1839.
- WALLENGREN (HANS DANIEL JOHAN) [1823-1894]. Lepidoptera Scandinaviae Rhopalocera, disposita et descripta (—Skandinavians Dagfjärilar). pp. xx + 280 + [iii]. 8vo. Malmö, 1853.  
*Purchased. Carnegie Grant.*

- WATSON (E. Y.). *Hesperiidae Indicae*, being a reprint of descriptions of the *HESPERIIDAE* of India, Burma, and Ceylon. pp. xv + 161. 8vo. Madras, 1891.  
*Purchased. Carnegie Grant.*
- WEBER (HERMANN). *Biologie der Hemipteren. Eine Naturgeschichte der Schnabelkerfe.* pp. viii + 543, text illust. 8vo. Berlin, 1930.  
*Purchased. Biologische Studienbücher, xi.*
- WEED (CLARENCE MOORES). *Life-histories of American Insects.* pp. xii. + 272, 21 pls., text illust. 8vo. New York, 1897.  
*Purchased. Carnegie Grant.*  
The plates are included in the pagination.
- WERNEBURG (A.). *Der Schmetterling und sein Leben. Eine naturgeschichtliche Skizze.* pp. [vi] + 169. 8vo. Berlin, 1874.  
*Purchased. Carnegie Grant.*
- WILKEN (CARL). *Käfer-Fauna Hildesheims.* pp. xi + 164. 8vo. Hildesheim, 1867.  
*Purchased. Carnegie Grant.*  
Schul-Programm des Gymnasium Andreanum zu Hildesheim.
- WINKLER (ALBERT). *Catalogus Coleopterorum regionis palaearcticae. Pars 1-.* 8vo. Wien, 1924-.  
*Purchased. Carnegie Grant.*  
Title from wrapper.
- WINNERTZ (JOH.). *Beitrag zu einer Monographie der Sciarinen.* pp. 187, 1 pl. 8vo. Wien, 1867.  
*Purchased. Carnegie Grant.*  
Published by the "Zoologisch-botanisch Gesellschaft in Wien."
- WOOD (J. G.). *Episodes of Insect life by "Acheta Domestica,"* edited and revised by Rev. J. G. Wood. 8vo. 1879. *See* *ACHETA DOMESTICA.*
- ZACHER (FRIEDRICH). *Die Geradflügler Deutschlands und ihre Verbreitung. Systematisches und synonymisches Verzeichnis der im Gebiete des Deutschen Reiches bisher aufgefunden Orthopteren-Arten (Dermaptera, Oothecaria, Saltatoria).* pp. vii + 287, 1 map. 8vo. Jena, 1917.  
*Purchased. Carnegie Grant.*
- ZOOLOGICAL MISCELLANY (THE). *The Zoological Miscellany. To be continued occasionally.* pp. 1-80†, text illust. 8vo. London, 1831-(1844).  
Wanting pp. 81-86, pls. 1-4.  
Issued in 6 parts. Pt. i, pp. 1-40, 4 pls., 1831; pt. ii, pp. 41-48, Mar. 1842; pt. iii, pp. 49-56, Apr. 1842; pt. iv, pp. 57-72, May 1842; pt. v, pp. 73-80, June 1842; pt. vi, pp. 81-86, June 1844.  
*Purchased. Carnegie Grant.*

# SEPARATES FROM PUBLICATIONS AND JOURNALS NOT RECEIVED IN THE LIBRARY.

- AINSLIE (C. N.). *The Western Grass-stem Sawfly, a pest of small grains.*  
[Tech. Bull. U.S. Dept. Agric., 157: 1-23, illust.] 1929.
- ALDRICH (J. M.). *Revision of the Two-winged flies of the genus Coelopa, Meigen, in North America.*  
[Proc. U.S. Nat. Mus., 76, Art. 11: 1-6.] 1929. *Smithsonian Institution.*
- ALDRICH (J. M.). *New genera and species of Muscoid flies.*  
[Proc. U.S. Nat. Mus., 76, Art. 15: 1-13.] 1929. *Smithsonian Institution.*
- ALEXANDER (CHARLES P.). *Undescribed TIPULIDAE (Diptera) from Western North America, Part II.*  
[Proc. Calif. Acad. Sci., (4) 11: 103-107.] 1921. *Mr. G. Talbot.*
- ALEXANDER (CHARLES P.). *New or little-known TIPULIDAE from the Philippines (Diptera), Part II.*  
[Philipp. J. Sci., 27: 71-81.] 1925. *Dr. Jordan.*
- ALLUAUD (CHARLES). *Coléoptères Cicindélides et Carabides [of East Africa].*  
[Voyage M. de Rothschild Ethiop. Afr. orient. angl., 1: 483-519, 2 pls. col.] 1922.  
*Mr. H. E. Andrewes.*
- ARNOLD (G.). *African species of SAPYGDIDAE.*  
[Ann. Transv. Mus., 13: 175-181, text illust.] 1929. *The Author.*
- ARROW (GILBERT J.). *Coléoptères érotylides et endomychides de l'Indochine française.*  
[Faune Colonies franç., 2: 329-357, text illust.] 1928. *The Author.*
- BABCOCK (K. W.) and VANCE (A. M.). *The Corn Borer in Central Europe. A review of investigations from 1924 to 1927.*  
[Tech. Bull. U.S. Dept. Agric., 135: 1-54, 10 pls.] 1929. *The Department.*
- BACK (E. A.) and COTTON (R. T.). *Control of Insect pests in stored grain.*  
[Farmers' Bull. Wash., 1483: 1-30: text illust.] 1929. *The Department.*



- BAKER (C. F.). The Malayan MACHAEROTINAE (CERCOPIIDAE).  
[Philipp. J. Sci., **15**: 67-80, 3 pls.] 1919. *Mr. G. Talbot.*
- BAKER (C. F.). The genus *Krisna* (JASSIDAE).  
[Philipp. J. Sci., **15**: 209-220, 5 pls.] 1919. *Mr. G. Talbot.*
- BAKER (C. F.). Notices of certain Fulgoroidea, II. The genus *Trobolophya*.  
[Philipp. J. Sci., **15**: 301-304, text illust.] 1919. *Mr. G. Talbot.*
- BAKER (C. F.). Second addition to Philippine and Malayan technical bibliography.  
[Philipp. Agric., **12**: 311-314.] 1924. *Dr. Jordan.*  
Wanting the earlier parts.
- BAKER (C. F.). Nomenclatorial notes on the Jassoidea, III-IV.  
[Philipp. J. Sci., **27**: 159-160, 537.] 1925. *Dr. Jordan.*  
Wanting parts i-ii.
- BAKER (C. F.). Spolia Mentawiensia: Homoptera—Fulgoroidea. . . with an introduction  
by C. Boden Kloss.  
[Philipp. J. Sci., **32**: 395-410, 1 pl., text illust.] 1927. *Dr. Jordan.*
- BAKER (W. A.) and others. The Sorghum Midge with suggestions for control. *See GABLE*  
(C. H.) and others. 8vo. 1928.
- BARRAUD (P. J.). A simple method for the carriage of living mosquitoes over long distances in  
the tropics.  
[Ind. J. Med. Res., **17**: 281-285, illust.] 1929. *The Author.*
- BARRAUD (P. J.) and COVELL (G.). The morphology of the buccal cavity of the mosquito.  
[Trans. Far-East. Ass. Trop. Med., **7**, 1927, **3**: 98-102.] 1929. *The Authors.*
- BARTLETT CALVERT (G.). *See CALVERT (G. BARTLETT).*
- BEAL (J. A.) and ST. GEORGE (R. A.). The Southern Pine Beetle, &c. 8vo. 1929. *See ST.*  
*GEORGE (R. A.) and BEAL (J. A.).*
- BELL (E. L.) and WILLIAMS (R. C.), jr. Short studies in American HESPERIIDAE. 8vo. 1930.  
*See WILLIAMS (R. C.), jr., and BELL (E. L.).*
- BERGROTH (E.). Hemiptera Heteroptera from New Zealand.  
[Trans. N.Z. Inst., **57**: 671-684.] 1926. *Mr. W. E. China.*
- BIGLER (W.). Die Diplopodenfauna des schweizerischen Nationalparks. pp. vii + 86 + (i), 3 tab.,  
text illust.  
[Ergeb. wiss. Untersuch. schweiz. Nationalparks, **5**.] 1929. (Ausgegeben Ende  
Dezember 1928). *The Publishers.*
- BISHOPP (F. C.). The Bollworm or Corn-Ear worm as a cotton pest.  
[Farmers' Bull. U.S. Dept. Agric., **1595**: 1-14, figs.] 1929. *The Department.*
- BISHOPP (F. C.), LAAKE (E. W.), and WELLS (R. W.). Cattle grubs or Heel Flies with suggestions  
for their control.  
[Farmers' Bull. U.S. Dept. Agric., **1596**: 1-22, figs.] 1929. *The Department.*
- BISSELL (T. L.) and WILLARD (H. F.). Parasitism of the Mediterranean fruit fly in Hawaii,  
1922-24. 8vo. 1930. *See WILLARD (H. F.) and BISSELL (T. L.).*
- BLANCHARD (EVERARD E.). Una nueva especie de "*Aleurothrixus*" (Homoptera, ALEYRODIDAE).  
[Physis, B. Aires, **4**: 344-347, illust.] 1918. *Mr. H. E. Box.*
- BLANCHARD (EVERARD E.). Apuntes sobre "*Zophodia analamprella*," Dyar, y otros  
Lepidópteros que viven sobre Cactáceas en la Argentina.  
[Physis, B. Aires, **6**: 119-123, illust.] 1922. *Mr. H. E. Box.*
- BLANCHARD (EVERARD E.). Apuntes sobre dos dípteros Argentinos.  
[Physis, B. Aires, **6**: 319-323, illust.] 1923. *Mr. H. E. Box.*
- BLANCHARD (EVERARD E.). A new aphidian tribe from Argentina.  
[Physis, B. Aires, **7**: 120-125, illust.] 1923. *Mr. H. E. Box.*
- BLANCHARD (EVERARD E.). Principales Cochinillas de los citrus en Argentina.  
[Cir. Min. Agric. Nac. Secc. Propagand. inform., **32**: 14, 1 pl. col.] 1923. *Mr. H. E. Box.*
- BLANCHARD (EVERARD E.). Sobre un Tingido nuevo para la Fauna Argentina.  
[Physis, B. Aires, **8**: 361-363, illust.] 1925. *Mr. H. E. Box.*
- BLANCHARD (EVERARD E.). Aphid Notes. 6 pts. illust.  
[Physis, B. Aires, **5**: 184-214.] 1922.  
[— **6**: 43-58.] 1922.  
[— **7**: 24-45.] 1923.  
[— **8**: 12-22, 324-337.] 1925-1926. *Mr. H. E. Box.*
- BLANCHARD (EVERARD E.). Two new egg-parasites from Argentina.  
[Physis, B. Aires, **8**: 598-602, illust.] 1927. *Mr. H. E. Box.*

- BLATCHLEY (W. S.). The Mexican Chicken bug in Florida.  
[Florida Ent., **11** : 43-44.] 1927. Dr. Jordan.
- BŁĘDOWSKI (RYSZARD) and KRAIŃSKA (MARJA KAZIMIERA). Die Entwicklung von *Banchus femoralis*, Thoms. (Hymenoptera, ICHNEUMONIDAE).  
[Bibl. Univ. lib. polon. 1926, A. **16** : 1-50, 8 pls., text illust.] 1926. Dr. Jordan.
- BOLTON (HERBERT). On a collection of Insect-remains from the South Wales Coalfield.  
[Quart. J. Geol. Soc. Lond., **67** : 149-174, 3 pls.] 1911. Dr. Jordan.
- BOLTON (HERBERT). Insect-remains from the Midland and South-eastern Coal Measures.  
[Quart. J. Geol. Soc. Lond., **68** : 310-323, 3 pls.] 1912. Dr. Jordan.
- BOLTON (HERBERT). On the occurrence of a giant Dragon-fly in the Radstock Coal Measures.  
[Quart. J. Geol. Soc. Lond., **70** : 119-127, 2 pls., text illust.] 1914. Dr. Jordan.
- BORGMEIER (Th.). Estudios mirmecológicos con la descripción de nuevas especies . . . por R. P. Th. Borgmeier. 4to. 1923. See BRUCH (CARLOS).
- BOUVIER (E. L.). Observations sur les Saturniens du genre *Copaza*.  
[C.R. Congr. Socs. sav. **1921** : (Sciences), 86-91, text illust.] 1922. Mr. G. Talbot.
- BOX (HAROLD E.). Los parásitos conocidos de las especies Americanas de "*Diatraea*" (Lepidoptera, PYRALIDAE).  
[Bol. Estac. exp. agric. Tucumán, **5** : 1-9.] 1928. Mr. H. E. Box.
- BOX (HAROLD E.). Preliminary report upon the occurrence in Argentina of a species of *Diatraea* new to the American fauna. [Without pagination.]  
[Ref. Book Sugar Ind. World, **1928**.] Mr. H. E. Box.
- BOX (HAROLD E.). La "Lagarta Rosada" del algodonoero (*Pectinophora gossypiella*, Saunders). Una plaga que no queremos tener en Tucumán.  
[Circ. Estac. exp. agric. Tucumán, **17** : 1-7, illust.] 1928. Mr. H. E. Box.
- BOX (HAROLD E.). La fumigación en la chacra.  
[Circ. Estac. exp. agric. Tucumán, **18** : 1-6, illust.] 1928. Mr. H. E. Box.
- BOX (HAROLD E.). El Brúquido del Poroto (*Bruchus obtectus*, Say).  
[Circ. Estac. exp. Agric. Tucumán, **19** : 1-11, illust.] 1928. Mr. H. E. Box.
- BOX (HAROLD E.). Apuntes preliminares respecto al descubrimiento de algunos parásitos de los huevos de "*Diatraea saccharalis*" en Tucumán.  
[Rev. ind. agric. Tucumán, **18** : 5-8, illust.] 1927. Mr. H. E. Box.
- BOX (HAROLD E.). La "*Diatraea saccharalis*" y las variedades de caña "P.O.J." Algunos observaciones y críticas.  
[Rev. ind. agric. Tucumán, **18** : 108-115.] 1927-1928. Mr. H. E. Box.
- BOX (HAROLD E.). Departamento de Entomología de la Estación Experimental Agrícola de Tucumán [1927].  
[Rev. ind. agric. Tucumán, **18** : 162-172, illust.] 1928. Mr. H. E. Box.
- BOX (HAROLD E.). Notas sobre la determinación científica del parásito díptero común de *Diatraea saccharalis*, Fabr., de las provincias del norte.  
[Rev. ind. agric. Tucumán, **19** : 132-133.] 1928. Mr. H. E. Box.
- BOX (HAROLD E.). El efecto producido en la composición individual de las cañas de un surco por la infestación del Taladrador (*Diatraea saccharalis*, Fabr.).  
[Rev. ind. agric. Tucumán, **19** : 291-315, illust.] 1929. Mr. H. E. Box.
- BOX (HAROLD E.). Observaciones sobre Taladrodore de la caña de azúcar. Una plaga nueva de la caña de azúcar : El gorgojo Taladrador (Coleoptera : CURCULIONIDAE).  
[Rev. ind. agric. Tucumán, **19** : 319-322, illust.] 1929. Mr. H. E. Box.
- BOX (HAROLD E.). Departamento de Entomología [1928] [Tucumán].  
[Rev. ind. agric. Tucumán, **19** : 261-269, illust.] 1929. Mr. H. E. Box.
- BRADLEY (J. C.). Ezra Townsend Cresson . . . with estimates of Cresson's work . . . by . . . J. C. Bradley. Svo. 1928. See CALVERT (PHILIP C.).
- BREHM (V.). Dr. Absolon's zoologische Höhlenforschungen auf der Balkanhalbinsel.  
[Naturw. Wschr. (n.f.) **16** : 49-53.] 1917. Dr. Jordan.
- BRÈTHES (JEAN). Sur une collection de Coccinellides (et un PHALACRIDAE) du British Museum.  
[An. Mus. nac. B. Aires, **33** : 145-175, illust.] 1924. Mr. H. E. Box.
- BRÈTHES (Juan). Parásitos e hiperparásito de "*Diatraea saccharalis*" en la caña de azúcar en Tucumán.  
[Rev. ind. agric. Tucumán, **17** : 163-166.] 1926-1927. Mr. H. E. Box.
- BROMLEY (S. W.). New ASILIDAE from China (Diptera).  
[Amer. Mus. Nov., **336** : 1-3.] 1928. Mr. G. Talbot.
- BROMLEY (S. W.). New Neotropical *Erax* in the American Museum of Natural History (Diptera : ASILIDAE).  
[Amer. Mus. Nov., **334** : 1-5.] 1928. Mr. G. Talbot.

- BROWN (CARL R.) and HATCH (MELVILLE H.). Orientation and "Fright" reactions of Whirligig Beetles (GYRINIDAE).  
[J. Comp. Psychol., **9** : 159-189, text illust.] 1929. Dr. Jordan.
- BRUCH (CARLOS). Metamorfosis y biología de Coleopteros Argentinos, I-II.  
[Rev. Mus. La Plata, **11** : 317-327, 3 pls.] 1904.  
[ditto **12** : 207-218, 3 pls.] 1906. Mr. H. E. Box.
- BRUCH (CARLOS). Contribución al estudio de las Hormigas de la provincia de San Luis.  
[Rev. Mus. La Plata, **23** : 291-357, 12 pls. illust.] 1916. Mr. H. E. Box.
- BRUCH (CARLOS). Observaciones biológicas sobre *Temnocera spinigera*, Wied. (Diptera : SYRPHIDAE).  
[Rev. Mus. La Plata, **24** : 176-181, 1 pl. illust.] 1919. Mr. H. E. Box.
- BRUCH (CARLOS). Metamorphosis of *Cotinis semiopaca*, Moser. (Coleóptero Lamellicornio).  
[Physis, B. Aires, **4** : 393-399, 1 pl. illust.] 1919. Mr. H. E. Box.
- BRUCH (CARLOS). Estudios mirmecológicos con la descripción de nuevas especies de dípteros ("PHORIDAE") por los RR. PP. H. Schmitz y Th. Borgmeier y de una araña ("GONYLEPTIDAE") por el Doctor Mello-Leitão.  
[Rev. Mus. La Plata, **27** : 172-220, 6 pls. illust.] 1923. Mr. H. E. Box.
- BRUCH (CARLOS). Doctor Carlos Bruch su obra científica. 8vo. 1924. See LIZER (CARLOS A.).
- BRUCH (CARLOS). Nuevos Histéricidos ecitófilos (Col.).  
[Rev. Mus. La Plata, **29** : 17-33, 2 pls. illust.] 1926. Mr. H. E. Box.
- BRUCH (CARLOS). Metamorfosis de "*Probaenia atricornis*," Pic (Coleóptero Hispido).  
[Physis, B. Aires, **9** : 1-7, illust.] 1928. Mr. H. E. Box.
- BRUCH (CARLOS). Descripción de dos Estafilinos nuevos.  
[Bol. Acad. nac. Córdoba, **29** : 415-418, illust.] 1928. Mr. H. E. Box.
- BRUCH (CARLOS). Estudios mirmecológicos.  
[An. Mus. nac. B. Aires, **34** : 341-360, 6 pls. illust.] 1928. Mr. H. E. Box.
- BRUCH (CARLOS). Adiciones al catálogo de los coleópteros argentinos ("CARABIDAE").  
[Physis, B. Aires, **9** : 448-450.] 1929. Mr. H. E. Box.
- BRUCH (CARLOS). Neue myrmekophile Histeriden und Verzeichnis der aus Argentinien bekannten Ameisengäste.  
[Zool. Anz. Leipzig, **82** : 421-437, illust.] 1929. Mr. H. E. Box.
- BRUNETTI (E.). Annotated catalogue of Oriental CULICIDAE.  
[Rec. Indian Mus., **1** : 297-377.] 1907.  
An erratum slip is bound between pp. 352-353 stating "Il faut regarder ces notes comme des Additions en manuscrit parce qu'elles ne sont pas actuellement publiées. Un vrai Supplement sera publié bientôt." Purchased.
- BUCHANAN (L. L.). North American species of the weevils of the Otiiorhynchid genus *Mesagroicus*.  
[Proc. U.S. Nat. Mus., **76**, Art. 4 : 1-14, 2 pls.] 1929. Mr. G. Talbot.
- BUGNION (E.). La Structure de la langue chez le Frelon (*Vespa crabro*).  
[Riviera sci., **12** : 17-41, text illust.] 1925. Dr. Jordan.
- BUGNION (E.). La voie bucco-pharyngée chez la Scolie, l'Abeille maçonne et la Xylocope violette.  
[Bull. Soc. zool. Fr., **50** : 171-197, text illust.] 1925. Dr. Jordan.
- BUGNION (E.). Notes relatives à la Terminologie des Organes buccaux des Insectes.  
[Bull. Soc. zool. Fr., **50** : 352-358.] 1925. Dr. Jordan.
- BURGESS (A. F.) and CROSSMAN (S. S.). Imported insect enemies of the Gipsy Moth and the Brown-tail Moth.  
[Tech. Bull. U.S. Dept. Agric., **86** : 1-147, 6 pls. (col.).] 1929. The Department.
- BURNSIDE (C. E.). Fungous diseases of the Honeybee.  
[Tech. Bull. U.S. Dept. Agric., **149**, 1-42, 6 pls.] The Department.
- BUTLER (A. G.). Nuevos Lepidópteros de Chile . . . traducidas . . . por G. Bartlett Calvert.  
[An. Univ. Chile, **86** : 751-777; **87** : 133-182, 459-532, 735-767; **88** : 311-353.] 1895.  
The articles originally appeared in English in Trans. Ent. Soc. Lond., 1881-1883. Dr. Jordan.
- CALVERT (G. BARTLETT). Nuevos Lepidópteros de Chile descritas por el señor A. G. Butler . . . traducidas . . . por G. B. Calvert. 1895. See BUTLER (A. G.).
- CALVERT (PHILIP P.). Ezra Townsend Cresson. A contribution to the history of Entomology in North America by Philip P. Calvert with estimates of Cresson's work on the Hymenoptera by H. T. Fernald, S. A. Rohwer, L. O. Howard, H. L. Viereck, T. D. A. Cockerell, and J. C. Bradley.  
[Trans. Amer. Ent. Soc., **52**: Supp. i-lxiii, port.] 1928. The Society.



- CALVERT (PHILIP P.). Different rates of growth among animals with special reference to the Odonata.  
[Proc. Amer. Phil. Soc., **68**: 227-274.] 1929. *Dr. Jordan.*
- CHAPMAN (ROYAL N.). Observations on the life-history of *Taphrocerus gracilis* (Say). (Beetle, Family BUPRESTIDAE.)  
[Mem. Cornell Univ. Agric. Exp. Stat., **67**: 1-13, 4 pls., text illust.] 1923. *Mr. G. Talbot.*
- CHARPENTIER (F.). Musculature et Squelette chitineux. Recherches sur le comportement de la musculature des flancs dans les segments cryptopleuriens du Thorax chez les Orthoptères.  
[Mém. Acad. R. Belg., **7**: 1-56, text illust.] 1923. *Dr. Jordan.*
- CHARPENTIER (F.). Sur les trachées de la base des pattes et des ailes de la Sauterelle verte (*Phasgonura viridissima*, L.).  
[Ann. Soc. sci. Brux., **47**, B, 63-86, text illust.] 1927. *Dr. Jordan.*
- CHINA (W. E.). Hemiptera: Pentatomoidea, collected in Korinchi, West Sumatra, by Messrs. H. C. Robinson and C. Boden Kloss.  
[F.M.S. Mus. J., **8**: 185-196, text illust.] 1928. *Mr. W. E. China.*
- CHRISTOPHERS (S. R.) and PURI (I. M.). Why do *Anopheles* larvae feed at the surface, and how?  
[Trans. Far-East. Ass. Trop. Med., **7**, 2: 735-739, 1 pl.] 1929. *The Authors.*
- COCKERELL (T. D. A.). Notes on the food of Birds.  
[Bull. Agric. Exp. Stat. New Mexico, **37**: 1-52.] 1901. *The Author.*
- COCKERELL (T. D. A.). Supplementary Notes on the Social Bees of the Philippine Islands.  
[Philipp. J. Sci., **16**: 631-632.] 1920. *Mr. G. Talbot.*
- COCKERELL (T. D. A.). Japan in 1923.  
[Sci. Mon. N.Y., **20**: 405-415.] 1925. *Dr. Jordan.*
- COCKERELL (T. D. A.). The Biology of Lake Baikal.  
[Science, N.Y., **66**: 552-554.] 1927. *Dr. Jordan.*
- COCKERELL (T. D. A.). Ezra Townsend Cresson . . . with estimates of Cresson's work . . . by . . . T. D. A. Cockerell, &c. 8vo. 1928. *See CALVERT (PHILIP C.).*
- COCKERELL (T. D. A.). Bees from the Australian Region.  
Pt. I. Northern Territory of Australia.  
Pt. II. Victoria, New South Wales, Queensland, and New Britain.  
[Amer. Mus. Nov., **346**: 1-18.] 1929. *Mr. G. Talbot.*
- COCKERELL (T. D. A.). Bees, chiefly Australian species, described or determined by Dr. H. Friese.  
[Amer. Mus. Nov., **343**: 1-20.] 1929. *Mr. G. Talbot.*
- COCKERELL (T. D. A.). Bees from the Australian region.  
[Amer. Mus. Nov., **346**: 1-18.] 1929. *The Author.*
- COLE (F. R.) and LOVETT (A. L.). An annotated list of the Diptera (Flies) of Oregon.  
[Proc. Calif. Acad. Sci., (4) **11**: 197-344.] 1921. *Mr. G. Talbot.*
- COLEMAN (MRS. EDITH). Pollination of the Orchid *Cryptostylis leptochila*, F.v.M.  
[Victorian Nat., **44**: 20-22, 1 pl.] 1927. *The Author.*
- COLEMAN (MRS. EDITH). Pollination of *Cryptostylis subulata*, (Labill.), Reichb.  
[Victorian Nat., **46**: 62-66, text illust.] 1929. *The Author.*
- CORPORAAL (J. B.). Vlinders. [Lepidoptera.] pp. 12, 4 pls. col. fol.  
[Haagsche Post, Kerstnummer, 1929.] *The Author.*
- CORPORAAL (J. B.). Über ein neues System zur Einrichtung von Insektensammlungen.  
[Wanderversam. deutsch. Ent., Giessen., **3**: 108-111, illust.] 1929. *The Author.*
- COTTON (R. J.) and BACK (E. A.). Control of Insect pests of stored grain. 8vo. 1929. *See BACK (E. A.) and COTTON (R. T.).*
- COVELL (G.) and BARRAUD (P. J.). The morphology of the buccal cavity of the mosquito. 1929. *See BARRAUD (P. J.) and COVELL (G.).*
- COWAN (FRANK T.). Life-history, habits, and control of the Mormon Cricket.  
[Tech. Bull. U.S. Dept. Agric., **161**: 1-28, text illust.] 1929. *Dr. Jordan.*
- COXEY (W. JUDSON). Impressions of Ecuador.  
[Yearb. Acad. Nat. Sci. Philad., **1926**: 5-20, 2 pls.] 1926. *Dr. Jordan.*
- CRESSMAN (A. W.) and DUMESTRE (J. O.). The Feeding-rate of the Australian Lady Beetle *Rodolia cardinalis*.  
[J. Agric. Res., **41**: 197-203, text illust.] 1930. *Dr. Jordan.*
- CROSSMAN (S. S.) and BURGESS (A. F.). Imported insect enemies of the Gipsy Moth and the Brown-tail Moth. 8vo. 1929. *See BURGESS (A. F.) and CROSSMAN (S. S.).*

- CUSHMAN (R. A.). A revision of the North American species of Ichneumon-flies of the genus *Odontomerus*.  
[Proc. U.S. Nat. Mus., 77, Art. 3: 1-15, text illust.] 1930. *The Museum.*
- CUSHMAN (R. A.). New species of Ichneumon-flies and taxonomic notes.  
[Proc. U.S. Nat. Mus., 76, Art. 25: 1-18.] 1930. *The Museum.*
- DAVIDSON (J.) and HENSON (H.). The internal condition of the host-plant in relation to insect attack, with special reference to the influence of Pyridine.  
[Ann. Appl. Biol., 16: 458-471.] 1929. *The Authors.*
- DAVIES (W. MALDWIN). The effect of variation in relative humidity on certain species of Collembola.  
[Brit. J. Exp. Biol., 3: 79-86.] 1928. *Dr. Imms.*
- DEL PONTE (E.). See PONTE (E. DEL).
- DE MEILLON (BOTH) and INGRAM (ALEXANDER). A mosquito survey of South Africa, &c. 8vo. 1927-29. See INGRAM (A.) and DE MEILLON (B.).
- DOURS (A.). Catalogue synonymique des Hyménoptères de France. pp. [iv] + 230. 8vo. Amiens, 1874.  
[Mem. Soc. linn. Nord Fr., 3.] 1874. *Purchased. Carnegie Grant.*
- DUBOIS (RAPHAËL). Contribution à l'étude de la production de la lumière par les êtres vivants. Les Elaterides lumineux.  
[Bull. Soc. zool. Fr., 11: 1-275, 10 pls., 2 charts, figs.] 1886.  
*Purchased. Carnegie Grant.*
- DUMESTRE (J. O.) and CRESSMAN (A. W.). The feeding-rate of the Australian Lady Beetle *Rodolia cardinalis*. See CRESSMAN (A. W.) and DUMESTRE (J. O.). 8vo. 1930.
- EGGERS (FRIEDRICH). Diopsiden aus Deutsch-Ostafrika. Mit einem Nachwort über die Stielaugen der Diopsiden.  
[Zool. Jahrb. Jena, Abt. Syst., 49: 469-500, 1 pl. col., text illust.] 1925.  
*Dr. Jordan.*
- FAILLA-TEDALDI (LUIGI) and MINÀ-PALUMBO (FRANC.). Materiali per la fauna Lepidotterologica della Sicilia. 4to. 1889. See MINÀ-PALUMBO (F.) and FAILLA-TEDALDI (L.).
- FERNALD (H. T.). Ezra Townsend Cresson . . . with estimates of Cresson's work . . . by . . . H. T. Fernald, &c. 8vo. 1928. See CALVERT (PHILIP P.).
- FERRIS (G. F.). Two Diptera Pupipara from Philippine bats.  
[Philipp. J. Sci., 24: 73-78, text illust.] 1924. *Dr. Jordan.*
- FERRIS (G. F.). Some Diptera Pupipara from the Philippine Islands.  
[Philipp. J. Sci., 25: 391-401, text illust.] 1924. *Dr. Jordan.*
- FERRIS (G. F.). The mallophagan family MENOPONIDAE. Part I.  
[Parasitology, 16: 55-66, text illust.] 1924. *Dr. Jordan.*
- FERRIS (G. F.). Fifth report upon Diptera Pupipara from the Philippine Islands.  
[Philipp. J. Sci., 34: 207-232, text illust.] 1927. *Dr. Jordan.*
- FINK (DAVID E.). The Catalase content of the Colorado Potato beetle during metamorphosis.  
[J. Agric. Res., 41: 691-696, text illust.] 1930. *Dr. Jordan.*
- FISHER (W. S.). New Malaysian CERAMBYCIDAE; Subfamily LAMIINAE.  
[Philipp. J. Sci., 28: 205-275.] 1925. *Dr. Jordan.*
- GEBIEN (HANS). Die Tenebrioniden (Coleoptera) des Indo-Malayischen Gebietes, unter Berücksichtigung der benachbarten Faunen.  
IV. Die Gattungen *Phlceopsidius*, *Dysantes*, *Basannus*, und *Diaperis*.  
V. Die Gattung *Ceropria*.  
VII. Die Gattung *Platydesma*, Castelnau und Brullé.  
[Philipp. J. Sci., 27: 131-156, 1 pl.] 1925.  
[— 27: 257-288, 1 pl.] 1925.  
[— 27: 539-593, 1 pl.] 1925.  
Wanting Nos. I-III, VI. *Dr. Jordan.*
- GÉNÉ (CARLO GIUSEPPE). De quibusdam insectis Sardiniae novis aut minus cognit. Fasc. 1-2. 4to. Torino. 1836-1839.  
[Mem. R. Accad. Sci. Torin., 39: 161-200, 1 pl., (2) 1: 43-82, 2 pls.]  
*Purchased. Carnegie Grant.*
- GEORGE (R. A. ST.). See ST. GEORGE (R. A.).
- GIBSON (ARTHUR) and TWINN (C. R.). Household insects and their control. (With a chapter on animal pests other than insects.)  
[Bull. Dept. Agric. Canada, (n.s.) 112, 1-84, text illust.] 1929. *The Department.*

- GRAHAM-SMITH (G. S.). The relation of the decline in the number of horse-drawn vehicles, and consequently of the urban breeding grounds of flies, to the fall in the summer Diarrhoea death rate.  
[J. Hyg. Cambridge, **29**: 132-138.] 1929. *The Author.*
- GRIFFINI (ACHILLE). Note intorno ad alcuni Grillacridi e Stenopelmatidi del Museum d'histoire naturelle de Genève.  
[Rev. suisse Zool., **19**: 461-500, text illust.] 1911. *Dr. Jordan.*
- GRIFFINI (ACHILLE). Il genere *Spizaphilus*, Kirby, e le sue specie.  
[Atti Soc. ital. Sci. nat., **50**: 303-314.] 1912. *Dr. Jordan.*
- GRIFFITHS (T. H. D.). *Anopheles atropos*, Dyar and Knab, a note on its breeding and other habits.  
[Pub. Health Rep. Wash., **1171**: 1903-1905.] 1927. *Dr. Jordan.*
- HAEUSSLER (G. J.). Parasites of the Oriental Peach Moth *Laspeyresia molesta*, Busck, in North America.  
[J. Agric. Res., **41**: 365-377, text illust.] 1930. *Dr. Jordan.*
- HAEUSSLER (G. J.) and PETERSON (A.). Life-history of the Oriental Peach Moth, &c. 8vo. 1930. See PETERSON (A.) and HAEUSSLER (G. J.).
- HANDSCHIN (EDUARD). Zur Kenntnis der Collembolenfauna der Hochmoore Estlands.  
[Beitr. Kunde Estlands, **10**: 167-176.] 1924. *Dr. Jordan.*
- HANDSCHIN (EDUARD). Ziele und Probleme der zoologischen Erforschung der Hochalpen.  
[Rev. suisse Zool., **32**: 65-71.] 1925. *Dr. Jordan.*
- HANDSCHIN (EDUARD). Die Collembolen des baltischen Bernsteins.  
[Zool. Anz., **65**: 179-182.] 1926. *Dr. Jordan.*
- HANDSCHIN (EDUARD). Materialien zur Revision der Collembolen *Sira platani*, Nic.  
[Tätigkeitsb. Naturf. Ges. Baselland, **7**: 85-98, text illust.] 1926. *Dr. Jordan.*
- HANDSCHIN (EDUARD). Untersuchungen über die Widerstandsfähigkeiten von Tapeten gegenüber Insektenfrass.  
[Z. angew. Ent., **13**: 466-476, text illust.] 1928. *Dr. Jordan.*
- HARRIS (R. C.) and COCKERELL (T. D. A.). The wings of the Meloid Beetles. 8vo. 1925. See COCKERELL (T. D. A.) and HARRIS (R. C.).
- HATCH (MELVILLE A.) and BROWN (CARL R.). Orientation and "Fright" reactions of Whirligig Beetles (GYRINIDAE). 4to. 1929. See BROWN (CARL R.) and HATCH (M. H.).
- HATCH (MELVILLE H.) and ORTENBURGER (A. I.). Notes on Coleoptera from South-eastern Oklahoma, &c. 8vo. 1926. See ORTENBURGER (A. I.) and HATCH (M. H.).
- HAZELHOFF (E. H.). Biologische Bestrijding van Insectenplagen met Behulp van Inheemsche Parasieten.  
[Hand. 5 Nederl. Ind. Natuurwet. Congr., 1928: 437-444.] 1928. *Mr. H. E. Box.*
- HAZELHOFF (E. H.). Bestrijding der witte Wolluis.  
[Arch. Suikerind. Ned. Indië, **1929**: 669-676, 2 pls.] 1929. *Mr. H. E. Box.*
- HAZELHOFF (E. H.). Entomologisch onderzoek.  
[Jaarsversl. Proefstat. Java Suik. Ind., **1928**: 96-111.] 1929. *Mr. H. E. Box.*
- HELLER (K. M.). New Philippine ZYGOPINAE, CALANDRINAE, and CRYPTODERMINAE (CURCULIONIDAE, Coleoptera).  
[Philipp. J. Sci., **25**: 287-307, 1 pl.] 1924. *Dr. Jordan.*
- HENSON (H.) and DAVIDSON (J.). The internal condition of the host-plant in relation to insect attack, &c. 4to. 1929. See DAVIDSON (J.) and HENSON (H.).
- HERMS (WILLIAM B.). *Diocalandra taiensis* (Guerin) and other coconut pests of Fanning and Washington Islands.  
[Philipp. J. Sci., **30**: 243-274, 8 pls., text illust.] 1926. *Dr. Jordan.*
- HERMS (WILLIAM B.). Limitations in the use of Top Minnows in *Anopheles* mosquito control in California and observations on Anopheline flight activities.  
[Stn. Med. J., Ala., **21**: 761-762.] 1928. *Dr. Jordan.*
- HOFFMANN (W. H.). Ueber *Triatoma flavida*, eine kubanische Reduviide.  
[Münch. med. Wschr., **1923**: 603-604.] 1923. *Dr. Jordan.*
- HORN (WALTHER). Über den musealen Missbrauch mit Insekten—"Typen."  
[Trans. Int. Zool. Congr. Budapest, **10**: 1022-1042.] 1929. *Mr. F. J. Griffin.*
- HOWARD (L. O.). Ezra Townsend Cresson . . . with estimates of Cresson's work . . . by . . . L. O. HOWARD, &c. 8vo. 1928. See CALVERT (PHILIP P.).
- HUBER (L. L.) and others. The European Corn Borer and its Environment.  
[Bull. Ohio Agric. Exp. Stat., **429**: 1-196, text illust.] 1928. *Dr. Jordan.*



- HUSTACHE (A.). Curculionides nouveaux des Philippines et l'Orient.  
[Philipp. J. Sci., 27: 371-396.] 1925. Dr. Jordan.
- HUSTACHE (A.). Contribution à l'Étude des Ceuthorhynchini.  
[Philipp. J. Sci., 26: 333-339.] 1925. Dr. Jordan.
- HUSTACHE (A.). Revisión des Baridiens de l'Amérique du Sud. 4to. 1929. See BRUCH (CARLOS).
- IBARRA (ROBERTO ALAMO). See ALAMO (ROBERTO).
- IMMS (A. D.). Observations on some parasites of *Oscinella frit*, Linn. Part 1.  
[Parasitology, 22: 11-36, text illust.] 1930. Presented by the Author.
- INGRAM (ALEXANDER) and DE MEILLON (BOTH). A mosquito survey of South Africa, with special reference to the carriers of malaria and their control. 2 pts.  
[Publ. S. Afr. Inst. Med. Res., 4: 1-170, [25] pls.] 1927-1929. Mr. De Meillon.
- JACKSON (C. H. N.). The Collembola of Wicken Fen, Cambridgeshire.  
[Nat. Hist. Wicken Fen, 4: 300-307, 1 pl.] 1928. The Author.
- KARNY (H. H.). Katyids (Tettigonioides) of the Philippine Islands, collected by C. F. Baker.  
[Philipp. J. Sci., 18: 607-617.] 1921. Mr. G. Talbot.
- KLEINE (R.). Die Lyciden der Philippinen-Inseln.  
[Philipp. J. Sci., 31: 33-114, 4 pls., text illust.] 1926. Dr. Jordan.
- KLOSS (C. BODEN) and BAKER (C. F.). *Spolia Mentawiensia* . . . with an introduction by C. Boden Kloss. See BAKER (C. F.). 4to. 1927.
- KRAIŃSKA (MARJA KAZIMIERA) and BLEDOWSKI (RYSZARD). Die Entwicklung von *Banchus femoralis*, Thoms. 8vo. 1926. See BLEDOWSKI (R.) and KRAIŃSKA (M. K.).
- KREKICH-STRESSOLD (H.). ANTHICIDAE of the Philippines, I.  
[Philipp. J. Sci., 27: 515-534, 3 pls.] 1925. Dr. Jordan.
- LAAKE (E. W.) and others. Cattle grubs or Heel flies, &c. 8vo. 1929. See BISHOPP (F. C.), LAAKE (E. W.) and WELLS (R. W.).
- LEEFMANS (S.). Ziekten en plagen der cultuurgewassen in Nederlandsch-Indië in 1928.  
[Medel. Inst. PlZiek., 75: 1-96.] 1929. The Institute.
- LEEUWEN (E. R. VAN). See VAN LEEUWEN (E. R.).
- LEFÈVRE (ED.). Eumolpidarum hucusque cognitarum catalogus, sectionum conspectu systematico, generum sicut et specierum nonnullarum novarum descriptionibus adjunctis. 8vo. 1885.  
[Mem. Soc. roy. Sci. Liège (2), 11.] 1885. Purchased. Carnegie Grant.
- LEITÃO (MELLO). See MELLO-LEITÃO.
- LIEBERMANN (JOSÉ). Morfología y sistemática de las "Tucuras" Argentinas (Acridioideos) con datos acerca de su distribución en el país, &c.  
[An. Soc. cient. argent., 108: 463-496, illust.] 1929. Mr. H. E. Box.
- LIEBKE (MAX). Neue Carabiden aus Argentinien und Bolivien.  
[Physis, B. Aires, 9: 346-354, illust.] 1929. Mr. H. E. Box.
- LIZER (CARLOS). Nota biológica sobre un Coleóptero Galícola.  
[Physis, B. Aires, 1: 432-435.] 1914. Mr. H. E. Box.
- LIZER (CARLOS). Un cóccido asiático nuevo para la República Argentina: "*Chrysomphalus dictyospermi pinnulifera*" (Mask.) [Hem. Hom.].  
[Physis, B. Aires, 2: 177.] 1916. Mr. H. E. Box.
- LIZER (CARLOS). Primer ensayo bibliográfico de Entomología Argentina.  
[Reunión Nac. Soc. Argent. Cienc. Nat., 1: 351-380.] 1919. Mr. H. E. Box.
- LIZER (CARLOS A.). Doctor Carlos Bruch su obra Científica.  
[Physis, B. Aires, 7: 213-227.] 1924. Mr. H. E. Box.
- LIZER (CARLOS A.). Apuntaciones para la bibliografía Entomológica Argentina.  
[Physis, B. Aires, 8: 505-535.] 1927. Mr. H. E. Box.
- LOVETT (A. L.) and COLE (F. R.). An annotated list of the Diptera (Flies) of Oregon. 4to. 1921. See COLE (F. R.) and LOVETT (A. L.).
- LUIGIONI (PAOLO). I coleotteri d'Italia. Catalogo sinonimico-topografico-bibliografico. Lge. 8vo. 1929.  
[Mem. pont. Accad. Sci. nuovi Lincei, (2) 13: 1-1160.] 1929. The Author.
- LUTZ (FRANK E.). Observations on Leaf-cutting Ants.  
[Amer. Mus. Nov., 388: 1-21, text illust.] 1929. Dr. Jordan.

- MABILLE (PAUL). Lepidópteros colectados por la Mision Scientifique du Cap Horn en 1882-1883.  
[An. Univ. Chile, **88** : 373-397.] 1895.  
This article originally appeared in French in "Mission scientifique du Cap Horn," 1882-1883, **6** (2), 1887.
- MALLOCH (J. R.). Some Far Eastern MUSCIDAE (Diptera).  
[Philipp. J. Sci., **26** : 507-510.] 1925. *Dr. Jordan.*
- MALLOCH (J. R.). The Anthomyiid Genus *Dichaetomyia*, Malloch (Diptera) in the Philippines.  
[Philipp. J. Sci., **26** : 321-332.] 1925. *Dr. Jordan.*
- MARELLI (CARLOS A.). El Gorgojo de los Eucaliptos hallado en la Argentina no es la especie originaria de Tasmania "*Gonipterus scutellatus*," Gyll.  
[Rev. Mus. La Plata, **30** : 257-269.] 1927. *Mr. H. E. Box.*
- MASON (ARTHUR C.) and YOTHERS (W. W.). The Citrus Rust Mite and its Control. 8vo. 1930.  
*See YOTHERS (W. W.) and MASON (A. C.).*
- MAYNE (BRUCE). Initial seasonal appearance of malaria in a selected area in India, demonstrated by presence of parasites in the insect carrier.  
[Trans. Far-East Ass. Trop. Med., **7**, 2 : 740-744.] 1929.  
*Imperial Bureau of Entomology.*
- MAYNE (BRUCE). A note on some experimental attempts to transmit mechanically malaria organisms through mosquito biting.  
[Trans. Far-East. Ass. Trop. Med., **7**, 2 : 745-748.] 1929.  
*Imperial Bureau of Entomology.*
- MAYNE (BRUCE). The nature of the "Black spores" associated with the malaria parasite in the mosquito and their relationship to the tracheal system.  
[Ind. J. Med. Res., **17** : 109-134, 4 pls.] 1929. *The Author.*
- MAYNE (BRUCE). Tests on the effects of coumarin on the life of the mosquito and the malaria parasite.  
[Ind. J. Med. Res., **18** : 963-969.] 1930. *The Author.*
- MAYNE (BRUCE). A study of the influence of relative humidity on the life and infectibility of the Mosquito.  
[Ind. J. Med. Res., **17** : 1119-1137, 1 pl.] 1930. *The Author.*
- MEILLON (BOTH A DE). *See DE MEILLON (BOTH A).*
- MELLO-LEITÃO ( ). Estudios mirmecológicos con la descripción de nuevas especies . . . por el Doctor Mello-Leitão. *See BRUCH (CARLOS).* 4to. 1923.
- METZGER (F. W.). Methods used in testing materials as repellants against the Japanese beetle.  
[J. Agric. Res., **40** : 659-671, text illust.] 1930. *U.S. Dept. Agriculture.*
- MINÀ-PALUMBO (FRANC.) and FAILLA-TEDALDI (LUIGI). Materiali per la fauna Lepidotterologica della Sicilia. 4to. 1889.  
[Nat. Sicil., **7** : 8 : ]. 1889. *Purchased.*
- MOSER (J.). New Philippine CETONIIDAE.  
[Philipp. J. Sci., **27** : 69.] 1925. *Dr. Jordan.*
- NEISWANDER (C. R.). The European Corn Borer and its Environment. 8vo. 1928. *See HUBER (L. L.) and others.*
- OPMANIS (K.). Ein Beitrag zur Kenntnis der Aphidenfauna Lettlands.  
[Acta Univ. latviensis, **18**, [reprint] 154 pp., text illust.] 1928. *Dr. Jordan.*
- ORTENBURGER (A. I.) and HATCH (MELVILLE H.). Notes on Coleoptera from South-eastern Oklahoma with a few records from adjacent portions of Texas and Arkansas, including a new species.  
[Proc. Okla. Acad. Sci., **6** : 142-148.] 1926. *Dr. Jordan.*
- PACKARD (C. M.) and WALTON (W. R.). The Hessian Fly and how losses from it can be avoided. 8vo. 1930. *See WALTON (W. R.) and PACKARD (C. M.).*
- PALUMBO (F. MINÀ-). *See MINÀ-PALUMBO (F.).*
- PARSHLEY (H. M.). Review of Van Duzee's "Catalogue of the Hemiptera of America north of Mexico excepting the APHIDIDAE, COCCIDAE and ALEURODIDAE." [Science, N.Y., (n.s.), **47** : 292-293.] 1918. *Dr. Jordan.*
- PATERSON (G. C.) and others. Observaciones sobre la distribución de los flebotomos de las provincias del noroeste de la República Argentina por los Dres. G. C. Paterson, R. C. Shannon y E. del Ponte.  
[Bol. Inst. Clin. quirúrg. B. Aires, **21-25**.] 1927. *Mr. H. E. Box.*

- PENNINGTON (MILES STUART). Notas sobre una pequeña colección de Hemípteros Heterópteros de Río Blanco.  
[Rev. chil. Hist. nat., **22**: 172-175.] 1918. Mr. H. E. Box.
- PENNINGTON (MILES STUART). Notas sobre Coreidos Argentinos. (— conclusion).  
[Physis, B. Aires, **5**: 28-39, 125-170, illust.] 1921-1922. Mr. H. E. Box.
- PENNINGTON (MILES STUART). Notas sobre la larva y la pseudomagen de la "*Nezara abnormis*," Berg.  
[Physis, B. Aires, **4**: 332-336, illust.] 1918. Mr. H. E. Box.
- PENNINGTON (MILES STUART). Notas sobre las especies Argentinas del género "*Nezara*," A. et S.  
[Physis, B. Aires, **4**: 527-530.] 1919. Mr. H. E. Box.
- PENNINGTON (MILES STUART). Nota sobre las especies Argentinas del género "*Phymata*," Latr.  
[Physis, B. Aires, **4**: 523-526, 2 pls.] 1919. Mr. H. E. Box.
- PENNINGTON (MILES STUART). Descripción de un nuevo hemiptero *Leptobyrsa mendocina*, n. sp.  
[Physis, B. Aires, **4**: 526-527, illust.] 1919. Mr. H. E. Box.
- PENNINGTON (MILES STUART). Notas sobre un caso de al enfermedad llamada "Ura," causado por la larva de la "*Dermatobia cyaniventris*," Macq.  
[Physis, B. Aires, **4**: 577-578, illust.] 1919. Mr. H. E. Box.
- PENNINGTON (MILES STUART). Hemípteros nuevos para la República Argentina.  
[Physis, B. Aires, **6**: 315-319, illust.] 1923. Mr. H. E. Box.
- PERCIVAL (E.) and WHITEHEAD (H.). A quantitative study of the fauna of some types of stream-bed.  
[J. Ecology, **17**: 282-314, 1 chart.] 1929. Dr. Imms.
- PETERSON (ALVAH) and HAEUSSLER (G. J.). Life-history of the Oriental Peach Moth at Riverton, N.J., in relation to temperature.  
[Tech. Bull. U.S. Dept. Agric., **183**: 1-37, figs.] 1930. The Department.
- PIERCE (W. DWIGHT). A monographic revision of the twisted winged insects comprising the order Strepsiptera, Kirby.  
[Bull. U.S. Nat. Mus., **66**, pp. xii + 232, 15 pls.] 1909. Mr. W. J. Lucas.
- PONTE (E. DEL) and SHANNON (R. C.). Sinopsis parcial de los Muscoideos Argentinos. 4to. 1926. See SHANNON (R. C.) and PONTE (E. DEL).
- PONTE (E. DEL) and others. Observaciones sobre la distribución de los flebótomos . . . de la . . . Argentina. Por los Dres. . . E. del Ponte, &c. 4to. 1927. See PATERSON (G. C.) and others.
- PURI (I. M.). Descriptions of the male, female, egg and larva of *Anopheles annandalei* var. *interruptus* nov. var., with corrections for the previous descriptions of the type species.  
[Ind. J. Med. Res., **17**: 385-395, 1 pl.] 1929. Presented.
- PURI (I. M.). A new tree-hole breeding Anopheles from South India—*Anopheles sintoni*, sp. nov.—and a revised description of the larva of *A. culiciformis*, Cogill.  
[Ind. J. Med. Res., **17**: 397-404, 1 pl.] 1929. Presented.
- PURI (I. M.). A note on two species of Indian Anopheline mosquitoes—*A. insulæ florum*, Swellengrebel, and *A. aitkenii*, James, with its variety *bengalensis*, nov. var.  
[Ind. J. Med. Res., **18**: 953-956.] 1930. Presented.
- PURI (I. M.) and CHRISTOPHERS (S. R.). Why do *Anopheles* larvae feed at the surface, and how? 4to. 1929. See CHRISTOPHERS (S. R.) and PURI (I. M.).
- RAGONOT (E. L.). Microlepidópteros chilenos descritos por Mr. Ragonot (Traducido para los Anales.)  
[An. Univ. Chile, **88**: 370-373.] 1895.  
This article originally appeared in French as "Nouveaux genres et espèces de PHYCITIDÆ et GALLERIDÆ par E. L. Ragonot." Paris, 1888.
- REINHARD (H. J.). Notes on the Muscoid flies of the genera *Opelousia* and *Opsodexia* with the description of three new species.  
[Proc. U.S. Nat. Mus., **76**, Art. 20: 1-9.] 1929. The Smithsonian Institution.
- RICHARDSON (CHARLES H.) and SHEPARD (HAROLD H.). The effect of Hydrogen-ion concentration on the toxicity of Nicotine, Pyridine and Methylpyrrolidine to Mosquito larvae.  
[J. Agric. Res., **41**: 337-348.] 1930. U.S. Dept. Agriculture.
- RIFFARTH (HEINRICH). Die Gattung *Heliconius*, Latr. Nach einem neuen System geordnet und catalogisirt nebst Beschreibungen neuer Formen. 2 Theil.  
[Berlin. ent. Z., **45**: 183-214, **46**: 25-183.] 1900-1901. Purchased.
- ROHWER (S. A.). The Philippine wasps of the subfamilies SCOLIJINÆ and ELIDINÆ.  
[Philipp. J. Sci., **19**: 75-90.] 1921. Mr. G. Talbot.



- ROHWER (S. A.). Some Philippine wasps of the family CHRYSIDIDAE.  
[Philipp. J. Sci., 18: 691-692.] 1921. *Mr. G. Talbot.*
- ROHWER (S. A.). Ezra Townsend Cresson . . . with estimates of Cresson's work . . . by  
. . . S. A. Rohwer, &c. 8vo. 1928. *See CALVERT (PHILIP P.).*
- ST. GEORGE (R. A.) and BEAL (J. A.). The Southern Pine Beetle: a serious enemy of pines in  
the South.  
[Farmers' Bull. U.S. Dept. Agric., 1586: 1-18, figs.] 1929. *The Department.*
- SALTER (R. M.). The European Corn Borer and its environment. 8vo. 1928. *See HUBER*  
*(L. L.) and others.*
- SCHAUFUSS (CAMILLO). Borkenkäferstudien, ii.  
[Insektenbörse, 22: 8, 11, 12, 15, 18, 19, 71, 79, 87, 103.] 1905. *Purchased.*
- SCHMITZ (H.). Estudios mirmecológicos con la descripción de nuevas especies . . . por R. P. H.  
Schmitz. 4to. 1923. *See BRUCH (CARLOS).*
- SHANNON (R. C.) and PONTE (E. DEL). Sinopsis parcial de los Muscoideos Argentinos.  
[Rev. Inst. Bact. B. Aires, 4: 549-590, 4 pls.] 1926. *Mr. H. E. Box.*
- SHANNON (R. C.) and others. Observaciones sobre la distribución de los flebótomos . . . de la  
. . . Argentina. Por los Dres. . . . R. C. Shannon, &c. 4to. 1927. *See*  
*PATERSON (G. C.) and others.*
- SHEPARD (HAROLD H.) and RICHARDSON (C. H.). The effect of hydrogen-ion concentration  
. . . to Mosquito larvae. 8vo. 1930. *See RICHARDSON (CHARLES H.) and*  
*SHEPARD (H. H.).*
- SHIBUYA (JINSHICHI). The systematic study on [sic] the Formosan PYRALIDAE. 4to. 1928.  
[J. Fac. Agric. Hokkaido Univ., 22: 1-300, 9 pls.] 1928. *The Author.*
- SILVESTRI (F.). Contribuzione alla conoscenza degli JAPYRIDAE (Thysanura) di Cuba.  
[Boll. Lab. Zool. Portici, 22: 263-281, figs.] 1929. *The Author.*
- SILVESTRI (F.). Aparato para Recolección de Pequeños artrópodos.  
[Conf. Reseñas cient. R. Soc. Españ. Hist. nat., 5: 11-13, text illust.] 1930.  
*The Author.*
- SINTON (J. A.). The identification and classification of the species of the genus *Phlebotomus*,  
with some remarks on their geographical distribution in relation to disease.  
[Trans. Far-East Ass. Trop. Med., 1927, 7: 3, 172-181, 1 pl.] 1929. *The Author.*
- SINTON (J. A.). Some new species and records of *Phlebotomus* from Africa.  
[Ind. J. Med. Res., 18: 171-193, 5 pls.] 1930. *The Author.*
- SINTON (J. A.). The female of *Phlebotomus nicnic*, Banks, 1919.  
[Ind. J. Med. Res., 18: 165-169, 1 pl.] 1930. *The Author.*
- SLEVOGT (B.). Die Grossfalter (Macrolepidoptera) Kurlands, Livlands, Estlands, und Ost-  
preussens mit besonderer Berücksichtigung ihrer Biologie und Verbreitung. 8vo.  
1910.  
[Arb. Naturf. Ver. Riga, (n.f.) 12: 1-235.] 1910. *Purchased. Carnegie Grant.*
- SMIT (BERNARD). The Sheep Blow-flies of South Africa.  
[Bull. Dept. Agric. S. Africa, 47: 1-27, 4 pls. (col.)] 1929. *The Department.*
- SMITH (G. S. GRAHAM-). *See GRAHAM-SMITH (G. S.).*
- SNAPP (OLIVER I.) and SWINGLE (H. S.). Life-history of the Oriental Peach Moth in Georgia.  
[Tech. Bull. U.S. Dept. Agric., 152: 1-16.] 1929. *The Department.*
- SNODGRASS (R. E.). The thoracic mechanism of a Grasshopper, and its antecedents.  
[Smithson. Contr. Knowl., 82, no. 2: 1-111, text illust.] 1929. *Mr. G. Talbot.*
- SPAETH (FRANZ). Zwei neue *Cassida*-Arten aus den Philippinen.  
[Philipp. J. Sci., 27: 125-129.] 1925. *Dr. Jordan.*
- SPAETH (FRANZ). Ist *Miltinaspis cassidoides* eine Cassidine?  
[Koleopt. Rdsch., 15: 28-30.] 1929. *Mr. H. E. Andrewes.*
- STALEY (J.) and MARSHALL (J. F.). The graphical representation of instar records in a regional  
mosquito survey. 8vo. 1929. *See MARSHALL (J. F.) and STALEY (J.).*
- STRAND (EMBRİK). Kritisches über P. Blüthgens Behandlung einiger *Halictus*-Arten.  
[Ent. Nachrichtbl., 3: 35-38, 60-68.] 1929. *The Author.*
- STRASSOLD (H. KREKICH-). *See KREKICH-STRASSOLD (H.).*
- SWINGLE (H. S.) and SNAPP (OLIVER I.). Life-history of the Oriental Peach Moth in Georgia.  
8vo. 1929. *See SNAPP (O. I.) and SWINGLE (H. S.).*
- SWINGLE (MILLARD C.). Anatomy and physiology of the digestive tract of the Japanese Beetle.  
[J. Agric. Res. 41: 181-196, text illust.] 1930. *The U.S. Dept. Agriculture.*

- TAKAHASHI (RYOICHI). Observations on the COCCIDAE of Formosa. Pt. I.  
[Rep. Dept. Agric. Formosa 40 : 1-82, 1-3, figs.] 1929. *The Author.*
- TAKAHASHI (RYOICHI). Notes on some Formosan APHIDIDAE.  
[Trans. Nat. Hist. Soc. Formosa, 19 : 92-103, illust.] 1929. *The Author.*
- TAKAHASHI (RYOICHI). Notes on some Chinese APHIDIDAE.  
[Lingnan Sci. J. 9 : 9-11.] 1930. *The Author.*
- TEDALDI (LUIGI FAILLA-). See FAILLA-TEDALDI (LUIGI).
- THEOBALD (F. V.). First report on the collection of CULICIDAE and CORETHRIDAE in the Indian Museum, Calcutta, with descriptions of new genera and species.  
[Rec. Indian Mus., 2 : 287-302.] 1908. *Purchased.*
- THEOBALD (F. V.). Second report on the collection of CULICIDAE in the Indian Museum, Calcutta, with descriptions of new genera and species.  
[Rec. Indian Mus. 4 : 1-33, 3 pls.] 1910. *Purchased.*
- TILLYARD (R. J.). Kansas Permian Insects. Pt. 10. The new order Protoperlaria : a study of the typical genus *Lemmatophora*, Sellards.  
[Amer. J. Sci., 16 : 185-220, text illust.] 1928. *The Author.*
- TILLYARD (R. J.). Kansas Permian Insects. Pt. 11. Order Protoperlaria : family, *Lemmatophoridae* (continued).  
[Amer. J. Sci., 16 : 313-348, text illust.] 1928. *The Author.*
- TILLYARD (R. J.). Kansas Permian Insects. Pt. 12. The family DELOPTERIDAE, with a discussion of its ordinal position.  
[Amer. J. Sci. 16 : 469-484, text illust.] 1928. *The Author.*
- TORRE (K. W. VON DALLA). See DALLA TORRE (K. W. VON).
- TRÄGÅRDH (IVAR). Om Tallbocken och dess bekämpande. (On the injury of the Pine-sawyer (*Monochamus sutor*, L.) and its prevention.)  
[Medd. Skogsförsökst. Stockh., 25 : 171-228, text illust.] 1929.
- TRELLES (CARLOS A. LIZER Y). See LIZER (CARLOS A.).
- TWINN (C. R.) and GIBSON (ARTHUR). Household insects and their control. 8vo. 1929. See GIBSON (A.) and TWINN (C. R.).
- VANCE (A. M.) and BABCOCK (K. W.). The Corn Borer in Central Europe. 8vo. 1929. See BABCOCK (K. W.) and VANCE (A. M.).
- VAN LEEUWEN (E. R.). Life-history of the Codling Moth in Northern Georgia.  
[Tech. Bull. U.S. Dept. Agric., 20 : 1-94.] 1929. *The Department.*
- VECHT (J. VAN DER). Over de middelandsche Zee-Fruitvlieg en de maatregelen tegen den invoer ervan in Nederlandsch-Indië.  
[Bull. Inst. PIZiek., 22 : 1-16, 2 pls.] 1929. *The Institute.*
- VIERECK (H. L.). Ezra Townsend Cresson . . . with estimates of Cresson's work . . . by . . . H. L. Viereck, &c. 8vo. 1928. See CALVERT (PHILIP P.).
- VILLA (ANTONIO) and (GIO. BATTISTA). Catalogo dei Coleopteri della Lombardia. pp. 77. 8vo. Milano, 1844. *Purchased. Carnegie Grant.*  
[Notiz. nat. civil. Lombardia, Vol. 1.]
- VILLA (GIO. BATTISTA) and (A.). Catalogo dei Coleopteri della Lombardia. 8vo. 1844. See VILLA (A.) and (G. B.).
- WAHLGREN (EINAR). Apterygoten aus Ägypten und dem Sudan, nebst Bemerkungen zur Verbreitung und Systematik der Collembolen. 8vo. 1909.  
[Results Swedish Zool. Exped. White Nile, 1901, L. A. Jägerskiöld, 3, pt. 1 : 1-72, text illust.] 1909. *Purchased.*
- WALTON (W. R.) and PACKARD (C. M.). The Hessian Fly and how losses from it can be avoided.  
[Farmers' Bull. U.S. Dept. Agric., 1627 : 1-14, text illust.] 1930. *The Department.*
- WASMANN (ERICH). Die Gastpflege der Ameisen ihre biologischen und philosophischen Probleme. (234 Beitrag zur Kenntnis der Myrmecophilen und Termitophilen). pp. xviii + 176, 2 pls., text illust. 8vo. Berlin, 1920.  
[Abhandlungen zur theoretischen Biologie. Hft. 4.] *Purchased. Carnegie Grant.*
- WASMANN (ERICH). La obra entomológica del Rev. P. Erich Wasmann. 4to. 1929. See BRUCH (C.).
- WELLS (R. W.) and others. Cattle grubs or Heel flies, &c. 8vo. 1929. See BISHOPP (F. C.), LAAKE (E. W.) and WELLS (R. W.).
- WHITEHEAD (H.) and PERCIVAL (E.). A quantitative study of the fauna of some types of stream-bed. 8vo. 1929. See PERCIVAL (E.) and WHITEHEAD (H.).

- WILEMAN (A. E.). Notes on Japanese Lepidoptera and their larvae. Pts. 1-9. 1914-1925.  
 [Philipp. J. Sci., **9** D : 247-267, 3 pls. col.; **10** D : 281-305, 3 pls. col.; 345-363, 3 pls. col.; **12** D : 229-247, 2 pls. col.; **13** D : 151-171, 2 pls. col.; **19** : 209-231, 2 pls. col.; **25** : 75-109, 2 pls. col.; **28** : 75-99, 2 pls. col.; 279-293, 1 pl. col.] 1914-1925. *The Author.*
- WILLARD (H. F.) and BISSELL (T. L.). Parasitism of the Mediterranean fruit-fly in Hawaii 1922-1924.  
 [Circ. U.S. Dept. Agric., **109**, pp. 12.] 1930. *The Department.*  
 A corrected edition has been issued.
- WILLIAMS (R. C.) jr., and BELL (E. L.). Short studies in American HESPERIIDAE (Lepidoptera : Rhopalocera).  
 [Trans. Amer. Ent. Soc., **56** : 133-138, 1 pl.] 1930. *The Society.*
- WILSON (R. N.). The Chinch Bug in relation to St. Augustine grass.  
 [Circ. U.S. Dept. Agric., **51** : 1-6, figs.] 1929. *The Department.*
- WOMERSLEY (HERBERT). The Collembola of Ireland.  
 [Proc. R. Irish Acad., **39** B : 160-202, text illust.] 1930. *The Author.*
- WOODRUFF (L. C.) and others. The Sorghum Midge with suggestions for control. 8vo. 1928.  
*See GABLE (C. H.) and others.*
- YOTHERS (W. W.) and MASON (ARTHUR C.). The Citrus Rust Mite and its control.  
 [Tech. Bull. U.S. Dept. Agric., **176** : 1-56, 1 pl. col., text illust.] 1930. *The Department.*
- ZELLER (P. C.). Microlepidópteros de Chile descritos por P. C. Zeller . . . traducidos del aleman.  
 [An. Univ. Chile, **88** : 355-370.] 1895.  
 This article originally appeared in German in Verh. zool.-bot. Ges. Wien, **24** : 423-448, 1874.





H. B. COTT PHOT.

*Natural Size*

Hawkmoth (*Xanthopan m. morgani*, ♀) at rest on bark of *Casuarina* ;  
Beira, July, 1927



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R. W. LLOYD, the entire cost of the panelling and ceiling in the new Meeting Room, together with the Presidential Desk and Chair.

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Dr. K. JORDAN, £50 donation in aid of building the new Meeting Room.

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P. I. LATHY, *Thèses entomologiques*, copy No. 2, including a proof set of the plates, uncoloured.



calculated the approximate distance from Fort Portal to Bongandanga from the data furnished by Steiler's Atlas (1925), and finds it to be 520 Geographical miles (about 600 Statute miles). The prevalence of favourable conditions leading to sudden and great increase in numbers over so wide a space is most interesting and offers a promising field for research. E. B. P. 17 October, 1930.]

OBSERVATIONS ON MIGRATING BUTTERFLIES IN THE NAIROBI DISTRICT: APRIL, 1930.—Prof. POULTON said that he had copied the following record from letters received from his friend Canon K. St. Aubyn Rogers, M.A. :—

“ 22 April, 1930. *Nairobi, Kenya Colony.*

“ We have had something of the nature of a migration of butterflies during the last three weeks. A good number of butterflies have been moving from West to East, the wind being more or less easterly. The movement has taken place during the middle hours of the day and only during bright sunshine. The species actually observed have been *Belenois mesentina*, Cram., *B. severina*, Cram., *Hypolimnys misippus*, L., and once *Synchlora glaucanome*, Klug. At the same time large numbers of the first three species, and some of the last, have been flying round and settling on flowers throughout the day. We have had plenty of rain this year—January 3.54 in., February 3.64 in., March 8.79 in., and 6.52 in., so far, this month, so we have had no dry season to speak of.

“ *Mimacraea marshalli dohertyi*, Rothsch., has been more numerous than usual and was on the wing for five weeks but I did not see any intermediates. There has been more rain than usual all over the country and our track into Nairobi is in an awful condition, so that we have to stay where we are. The rains will probably continue for some weeks yet. It is rather a change after the dry seasons we have had lately.

“ 30 April, 1930.—This is merely a postscript to my last letter. Just after I wrote to you *Hypolimnys misippus* disappeared altogether after being very plentiful for some weeks. This looks as if it really was migrating, though, owing to torrents of rain, all butterflies are much less numerous, but that would not account for total disappearance, as the other species are still common. We get a good deal of sunshine during the day and most of the rain comes at night. We have had 12 inches this month.

“ P.S. Since writing the above this morning I have seen 2 ♂ and 2 ♀ of *H. misippus*, all quite fresh, so it is coming out again.”

ATTACKS BY BIRDS UPON THE MIGRATING PIERINE BUTTERFLY *BELENOIS MESENTINA*, CRAM., IN E. AFRICA.—Prof. POULTON said that he had received the following interesting record from his friend Mr. C. B. Williams, M.A., who had written 15 April, 1930 :—

“ In describing a flight of *mesentina* at Amani [N.E. Tang. Terr.], in February 1930, R. E. Moreau writes—‘ Our turkey-poults have been chasing them eagerly, bulbuls hawking them and drongos catching them and snipping the wings off.’ Moreau is a first-class observer and ornithologist, so you can be sure of the identification of the birds.”

ATTACKS BY A SPARROW UPON THE PIERINE BUTTERFLY *APORIA BIETI*, OBERTH., AT TACHIENLU, TIBET.—Prof. POULTON communicated the following interesting observation made by Mr. H. Stevens when travelling with the Kelley-Roosevelt Expedition. Mr. Stevens kindly wrote 1 January, 1930:—

“I travelled some 1600–1700 miles by trail through Yunnan, Szechwan, the Borderland of Tibet, Yeutong and Mouping, etc., and took for the most part a different route from that of my friends—the Roosevelts. The only incident which came under my observation in respect to the facts in which you are interested was at Tachienlu (Szechwan Prov., W. China), when on 8 June, 1929, during a baking morning, after heavy rain previously, I saw numbers of *Aporia bieti*, Oberth., lazily flitting about the compound of the China Inland Mission, being attacked both in the air and on the ground, with varying success, by numerous sparrows (*Passer montanus obscuratus*, Jacobi). This butterfly on occasions clustered at favoured spots, sometimes in a dense pack. I do not remember to have ever seen larger clusters of any butterfly, and should certainly have regarded the Aporias as immune from the attacks of birds except as a last resource. Numbers of them were demolished whilst others managed to escape in a damaged condition.”

Commenting on these communications, Mr. C. B. WILLIAMS remarked that in 1913–1914 he was breeding large numbers of *Pieris napi* at Merton, Surrey, for some hybridisation experiments. Hundreds of unwanted specimens were liberated, and many of them were immediately captured by a robin, which finally became so tame as to enter the outhouse and to take newly emerged specimens of the butterfly from his fingers.

THE PINE HAWKMOTH, *HYLOICUS PINASTRI*, L., ATTACKED, PROBABLY BY A BIRD AT PARKSTONE.—Prof. POULTON exhibited the two fore-wings of *H. pinastri* which he had received, just in time for the meeting, from Mr. W. Parkinson Curtis, F.E.S., who had written as follows:—

“15 June, 1930.—My wife picked up these two wings of *Hyloicus pinastri* at the foot of a pine this morning. We made careful search for the hind-wings, but there was no sign of them. You will notice that the fore-wings are very sharply clipped through close to the body.

“In the locality in question there are the following possibilities:—

“Birds.—*Athene noctua*, *Caprimulgus europaeus* (both these hunt on the wing), *Gecinus viridis pluvius*, *Dryobates major anglicus*, *Emberiza schoeniclus*, *Emberiza citrinella*, *Cerchneis tinnunculus*.

“Lizard.—*Lacerta agilis*.

“Mammals.—*Mus sylvaticus*.

“Cheiroptera.—Pipistrelle and possibly the Great Horseshoe Bat.

“The wings were about 3 inches from the tree foot, quite dry. As *H. pinastri* only climbs a few inches to 2 feet to dry its wings—I have, out of 12 found, not seen one higher than 4 feet—a mouse is a possibility. On the other hand, the position of the wings suggest that the insect might have been taken at rest. I incline to *G. viridis pluvius* as the culprit, but the observation certainly shows that a large moth like *pinastri* is subject to attack like the small fry. One would rather gather this to be so from the coloration. On the other hand, we don't find it a difficult insect

to see, especially when freshly emerged and drying its wings—we found a ♂ and a ♀ this morning in that attitude—but even with wings depressed it is not difficult to find. So far I have seen 3 wild ones this year, but have been breeding from local ova as well. The locality is curiously restricted, and W. Fassnidge, who is familiar with the species, says that the place I find them in is very unlike the country they frequent on the continent.”

There existed in the Hope Collection, a R.F.-W. of the same species picked up by the speaker in a pine wood between La Granja and Peñalara, Sierra Guadarrama, Spain, about 5500 ft., 25 July, 1902. It was entire, having been torn off at the very base. He agreed with Mr. Parkinson Curtis that the coloration, though evidently procryptic, was not well adapted to conceal the insect on the pine, which is its food-plant in this country. It might be suggested that the moth was originally adapted to harmonize with a pine having a greyer bark or one living in conditions which promoted a greyish growth on the trunk.

SYMMETRICAL INJURIES IN CAPTURED *COLIAS EDUSA*, L., AND *PYRAMEIS ATALANTA*, L.—Prof. POULTON exhibited these two butterflies taken in 1928 at Eastbourne, Sussex, by Mr. A. L. Rayward, F.E.S. It was evident that both had been seized at rest with the wings closed. The *edusa*, a male, exhibited a remarkable injury, nearly half of both hind-wings having been torn away together with a large piece of the underlying fore-wings. More than half of the hind-wing costa was wanting, and from its broken-off end the tear extended towards but did not quite reach the anal angle. It was remarkable that the butterfly should have escaped with such an extensive injury. Mr. Rayward stated that “it was in fact getting along at quite a good pace, although not in a normal manner.” The *atalanta* showed a characteristic injury to the anal angle of both hind-wings, an injury which would have included the fore-wings if they had been lowered to the final position of rest, but would not include them at the earlier stage immediately after settling. It would be necessary to set the insect in order to decide this point satisfactorily.

AN ICHNEUMONID BEARING THE POLLINIA OF AN ORCHID.—Prof. POULTON exhibited a male specimen of *Cryptus tarsoleucus*, Gr., kindly determined by Dr. C. Ferriere. The insect, which was taken, 7 June, 1930, in Bagley Wood, Oxford, by his friend Mr. A. H. Hamm, A.L.S., bore on its face the pollinia probably of *Orchis maculata* which was flowering abundantly at the time. The pollinia were attached in what appeared to be an extremely inconvenient position upon or at any rate in front of the mandibles.

THE POSITION OF THE SEXES IN THE PAIRED *VOLUCELLA BOMBYLANS*, L. (DIPTERA; SYRPHIDAE).—Prof. POULTON exhibited the male and female of *V. bombylans* var. *mystacea*, L., captured in Bagley Wood, 7 June, 1930, by Mr. A. H. Hamm. The male, which was much the larger, bore the female in flight, the long axes of the insects being continuous and horizontal, with the dorsal surface of the male, but the ventral surface of the female uppermost. The pair thus presented a remarkable appearance, and especially so when they came to rest on the surface of a leaf. The attitude was brought about, as suggested by Mr. O. W. Richards in a



letter to Mr. Hamm, in the following manner. Starting with the normal position of the SYRPHIDÆ when paired—the male above and the dorsal surface of both sexes uppermost and horizontal—we were led to believe that the male released his grip with the legs so that the female would drop at first into a vertical position and then swinging through a half circle would become horizontal again but with the ventral surface uppermost.

THE LIFE-HISTORY OF SOME HETEROCERA.—Mr. T. BAINBRIGGE FLETCHER exhibited specimens of Indian moths including a hermaphrodite Lasiocampid, *Metanastria hyrtaca*, the left side female and the right side male. The specimen was reared in Travancore.

A specimen and a coloured plate showing the life-history of *Heteromiza leucogonia*, Hmps., from Shillong, Assam. Figures of the larva of this species, which greatly resembles a piece of dead stick, were exhibited to the Society four years ago, but it was not then known to what species the larva belonged. In 1928 two larvae were obtained in Shillong and the moth reared.

Specimens of *Crambus brachyrrhabda*, Hmps., taken in Tibet at an altitude of 16,000 feet. Only the type specimen was previously known, and that was taken, about 25 years ago, in an unspecified locality during the Tibet Expedition.

A plate showing the complete life-history of the Zygaenid, *Himantopterus dohertyi*, from Shillong, Assam. The moth lays a batch of eggs on the underside of oak leaves, both the local *Quercus griffithi*, and the introduced *Q. robur*. Each egg is separate and covered with erect hairs, and when the larvae hatch out they feed side by side, in a row, on the lower surface of the leaf. The larvae feed only on oak. The eggs are laid about the beginning of July, the larvae becoming full fed in October and the moths emerging in the following June. Termites are not connected with any stage of development as is alleged to be the case in an allied species.

A coloured plate illustrating the life-history of the Thyridid *Betousa stylophora*, the larvae of which are common in galls on the stems of *Phyllanthus emblica* at Pusa, India. When full fed the larva emerges from the gall to pupate in a cocoon formed within leaflets of its food-plant.

Some coloured plates of Indian Tortricina were also exhibited.

A WOOD-BORING DIPTEROUS LARVA FROM TRINIDAD.—Mr. F. W. URICH exhibited specimens and made remarks on a wood-boring Dipterous larva of the family PANTOPHTHALMIDÆ from Trinidad, and illustrated his remarks with lantern slides.

AN APPARENTLY NEW MANTID FROM ANGOLA.—Dr. M. BURR exhibited an apparently new Mantid from the interior of Angola showing a remarkable adaptation to its environment. He also exhibited a series of Orthoptera showing adaptation to the environment of burnt ground and vegetation left by a fire.

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Wednesday, October 1st, 1930.

Dr. K. JORDAN, President, in the Chair.

*Election of Fellows.*

The following were elected Fellows of the Society:—Dr. A. B. MISRA, Benares Hindu University, India, and the Molteno Institute, Cambridge; and Mr. JOHN STALEY, of the British Mosquito Control Institute, Hayling Island, Hants.

*Obituary.*

The deaths of Professor SELWYN IMAGE and of Mr. G. T. LYLE, Fellows of the Society, were announced.

*Exhibits.*

NEW AND RARE INSECTS FROM WINDSOR FOREST.—Mr. DONISTHORPE exhibited a series of the Dipteron *Calobata calceata* which he had discovered in Windsor Forest on July 1st, 1930, and subsequent dates, this being a fine addition to the British list. He described how it was taken, and stated that a series had been given to the British and Oxford Museums, and to Mr. J. Collin. He also showed some thirty specimens of the Cryptophagid beetle, *Atomaria pulchra*, Er., taken in and about the borings of the ant *Acanthomyops (Donisthorpea) brunneus*, Latr., in a felled oak in Windsor Forest in July and August last. This beetle was also new to the British list.

AN IMPROVED TYPE OF AIR-PUMP FOR LABORATORY USE.—Dr. H. ELTRINGHAM exhibited an improved type of air-pump which he had designed and constructed for use in the histological laboratory. He explained that there were three principal disadvantages in the ordinary aspirator pump apart from its fragile construction. The connection tube had to be clamped to prevent back flooding, there was no measure of the vacuum obtained, and sudden disconnection of the tube caused an almost explosive inrush of air which was liable to damage or distort delicate tissues. The instrument exhibited was constructed entirely of brass. The action was similar to that of the ordinary aspirator, but the exhaust tube leading from it was provided with two taps each of which had a two-way opening. On turning the first tap the connection with the aspirator was closed thus preventing back flooding, at the same time the exhaust tube became connected with a small valve by which the normal air pressure could be admitted to the exhausted material as slowly as desired. On turning the second tap, air was admitted to the aspirator which then immediately drained itself. Beyond the taps a vacuum gauge was fixed on the exhaust tube, and the extent of the vacuum could thus be measured. He stated that with the ordinary mains pressure a vacuum of about 27 inches could be obtained.

OBSERVATIONS ON THE INSECT FOOD OF THE COATI.—Prof. POULTON, in the unavoidable absence of his friend the author, communicated the following notes by Dr. J. G. MYERS:—

In May, 1929, a young female Coati \* of the common ring-tailed species (*Nasua*

\* Dr. Myers informs me that this animal is now in the Zoo—their smallest female ring-tailed Coati—in the outdoor cage.—E. B. P.

*nasua*) was obtained at an Indian settlement on the Wauna Creek, North-West District of British Guiana. Although never really tamed in any disciplinary sense, it became exceedingly attached to my wife, and was therefore given complete liberty in the field, since it would always follow us. On such occasions it hunted assiduously on its own account, and was occasionally given insects we had caught, but which it might also have captured itself. Its preferences, so far as insect food are concerned, were thus observed under practically natural conditions, for the Coati is essentially a diurnal species. Unfortunately we left British Guiana soon after it came into our possession, and most of the following notes were made in Trinidad. It is, however, well known that the fauna of this island is characteristically mainland. In any case it is certain that the Coati, in its Trinidad hunting, recognised the main categories of insects to which it had been accustomed in British Guiana. The excursions on which it was allowed full liberty were made in cane, cacao, and rice-fields, second-growth and virgin forest, both lowland and mountain. All the critical observations on the discrimination of distasteful species were made in Trinidad, and only general notes in Cuba and Jamaica, where it was thought the great difference in the fauna would invalidate any special conclusions by introducing too many unaccustomed species of insects.

Beebe makes the truly surprising statement that the Coati is a denizen of the 20-foot tree layer in the virgin forest. The traveller-naturalists have more usually described it as hunting in small parties on the floor of the forest. Although the Coati is an excellent climber, the latter observers are unquestionably correct, and Beebe entirely wrong. In reality the Coati is a mammalian snipe, with an over-developed *penchant* for grubbing in the ground, which habit, with its irresistible temptation to poke its nose into everything else as well, has led to its being known among white colonists as "Nosy Parker," and merits the application of the name "Sticky Beak" in the fullest sense of that very expressive Australian term.

Certain whole groups of insects were entirely rejected, and it was evident that they were not regarded as entering into a food category at all. This applies especially to all adult Lepidoptera, large or small. When stumbled on accidentally, or offered by us, they were usually patted hard whenever they moved, and thus often in the end killed; but practically never sniffed and never tasted. We had the impression, without proof, that the scales were embarrassing and completely disguised all possible food value or attraction.

Besides insects, small birds, lizards, snakes, frogs, eggs and worms were all eaten when opportunity offered, and also vegetable food such as fruits. Apparently the only limiting factors for vertebrate prey were size and agility. The only partial exception we saw to this was the case of the common toad in Cuba. Frogs were seized rapidly and as quickly disembowelled with the long claws of the fore-feet, the viscera being obviously greatly enjoyed. I saw the Coati pounce on a toad (*Bufo peltacephalus*) in the same way. The toad at once swelled tremendously and emitted a loud hissing during the subsequent rough handling. Evidently thinking that I was about to interfere, the Coati carried it a short distance in its mouth, but dropped it quickly, with signs of distaste. Then, the toad being still swollen almost to a sphere, the Coati turned it repeatedly over and over, or round and round, and clawed ferociously at its cloaca, apparently in an endeavour to eviscerate it. But



the skin was much tougher than that of the frogs, and the attempt was unsuccessful. So the Coati settled down to chew off one of the fore-legs—and at this juncture I had to leave. Barbour and Ramsden, in their work on the herpetology of Cuba, say of this toad—“As with so many of the larger species of *Bufo* the white discharge from the parotoid glands is copious and powerful, and experience has taught both men and dogs of its highly venomous nature.” This instance is given to show that the Coati is by no means particularly delicate about its food, and that a defence which is well-known to operate against dogs, had very little effect upon it.

The Arthropod food-animals listed below probably form only a very small proportion of the species preyed upon by such an omnivorous mammal; but this makes the rejections even more significant. The prey has been divided into three main groups according as they, firstly, were seized without hesitation and eaten without precaution, secondly, were handled very gingerly, but afterwards readily eaten, or, thirdly, rejected summarily.

I am greatly indebted to Mr. K. G. Blair, Mr. G. E. Bryant, Mr. W. E. China, Mr. D. E. Kimmins, and Mr. B. P. Uvarov for determining the insects concerned.

#### I. Arthropods readily seized and eaten.

Lamellicorn and other beetle-larvae in turf, soil or rotten wood. These, with earthworms, were perhaps the staple invertebrate food. Hours were spent in grubbing for them, the snout rooting like a pig's, and at times, with or without preliminary digging, inserted to the eyes. It was not always possible to see all that this subterranean hunting produced.

Boring Lepidopterous and Coleopterous larvae, *e.g.*, those of *Diatraea* spp., *Castnia licoides*, *Metamasius* spp., *Rhynchophorus palmarum*, *Stirastoma depressum*. The borings were eagerly followed with the snout and ripped open with the powerful claws and teeth.

Spiders, centipedes, small Mantids (but see p. 73), Melolonthid and small Dynastid beetles were all readily eaten.

More specifically, Nos. 338–342 and 1016–1018 were eagerly snapped up and devoured. This happened invariably, though they were offered on these and other occasions as many as thirty times each. Their brief description follows:—

T338. *Tauroma taurus*, Fabr., a metallic black Cassidid beetle with bronze reflections.

T339. *Orphulella punctata*, de Geer, ♂. } Brownish or greenish small Acridid  
T340. Larva of above sp. } grasshoppers.

T341. } *Glyptoscelis aeneipennis*, } Small, shining grey-brown Phytophagous  
T342. } Baly. } beetles. (EUMOLPIDAE.)

1016. *Homalispia batesi*, Baly. Small, shining dark blue and bright red Phytophagous beetles. (HISPIDAE.)

1017. *Spilochalcis*, sp., a brown and yellowish Chalcid.

1018. *Griburius superbiens*, a small, shining, black and yellow Phytophagous beetle. (CRYPTOCEPHALIDAE.)

#### II. Arthropods received with hesitation, but afterwards readily eaten.

Aculeate Hymenoptera, including *Apis mellifica* and large local Vespids, such as *Polistes* spp. An attempt was invariably made to beat these down with the fore-

paws. The Coati then, with its long and sensitive nose held high in the air and back out of the way, patted the insect hard and repeatedly with both fore-paws held close together and straight out in front, until it was incapacitated. It was then snapped up, chewed and swallowed with gusto. The Coati by no means always escaped without a sting. Eristaline SYRPHIDÆ of Hymenopterous appearance were accepted readily and without hesitation.

Large Dynastid beetles were handled with care, and scrabbled with the fore-paws, before being eaten (save the elytra) with gusto.

The following are transitional or doubtful cases :—

T343. *Membracis tectigera*, Oliv. A black and yellow foliate Membracid. Sniffed suspiciously, taken up, tentatively bitten once or twice, and finally crunched and swallowed, but not eagerly. A second specimen was treated in much the same way. This is evidently only barely palatable. *Cockroaches*.—In Trinidad, *Periplaneta americana* was played with and battered about but definitely refused as food. Yet some small, obscurely coloured species found by the Coati itself out-of-doors were eaten, as was also *Blattella germanica* on shipboard, when insect food was otherwise entirely lacking.

### III. Arthropods rejected summarily.

Nos. T344–348, 1019–1024, 1048, 1060, 1061, 1065–1069, were all sniffed once, and at once rejected. Their brief description follows :—

T344. *Photuris vittipennis*, Mots. v. *conformis*, E. Oliv., a common pale brown firefly. Emits a disagreeable smell and a staining liquid when handled.

T345. *Tomaspis saccharina*, Dist., the sugar-cane froghopper (CERCOPIDÆ), adult, yellow and blackish. Exudes a liquid when handled.

T346. *Calopteron juvenile*, Bourg., a yellow and black Lycid beetle.

T347. *Sphictyrtus intermedius*, Stal, a dark metallic green, red, and black Coreid bug. Emits a disagreeably-smelling secretion. On one occasion, this was interpolated in a long series of much-liked grasshoppers, and was taken unsuspiciously, chewed rapidly and swallowed; but the Coati at once attempted to vomit and showed every sign of disgust. The next insect (a favourite grasshopper) was received with great wariness and examined carefully before it was eaten.

T348. *Epicauta grammica*, Fisch., a dull yellow and black Meloid beetle. Disagreeable secretion.

1019. *Bruchus scapularis*, Pic., a bright red and black Bruchid.

1020. *Pygolampis* sp., a dull brownish firefly. Evil-smelling.

1021, 1022. *Diabrotica tripunctata*, F., a reddish-brown and yellowish-green Chrysomelid beetle.

1023. *Homophoeta albicollis*, F., a shining black and yellowish Phytophagous beetle. (HALTICIDÆ.)

1024. *Edessa* sp., a dull olivaceous-brown Pentatomid bug. Evil-smelling.

1048. *Calopteron* sp. (? *tricolor*, Ol., var.), a plain brownish Lycid beetle.

1060. *Megaderus stigma*, L., a dull black Longicorn beetle with a striking reddish-yellow bar across each elytron. No smell appreciable to me.

1061. *Acanthocephala angustipes*, Westw., a dull brown Coreid bug, very evil-smelling.

1065. *Calopteron asciatum*, F., a conspicuously black and yellow Lycid beetle.

1066. *Plateros* sp. (not named in British Museum). Similar to the last, but smaller.

1067. *Cryptocerus atratus*, L., ♀, a large, deep black, exceedingly spinose ant. Ants in general were definitely ignored,\* save on two occasions as follows:—once in Jamaica my wife saw the Coati lick up some small brown ants from the ground; and once in Trinidad, when it found itself in the midst of a column of hunting ants (*Eciton* sp.), it sprang into electric activity, jumped vigorously from side to side and dashed up a smooth, nearly perpendicular log, where it clung some time in a difficult position before venturing down again. In spite of this evident fear of them, however, it blundered into the column twice again within half an hour, with similar results. It may perhaps be mentioned here that termites were definitely feared, judging by the Coati's behaviour when placed on or near a broken, swarming nest. In no case either at the nest or elsewhere, were they eaten.

1068. *Leucochrysa lateralis*, Navás. } Very evil-smelling Chrysopids.  
1069. *Chrysopa* sp. }

*Utetheisa ornatrix*, larva. A yellow and black caterpillar with reddish head, and long sparse hairs, some of which are white and some black. This was scarcely vouchsafed a sniff.

A curious case was that of a green, cryptically-coloured mantis. This was seized without hesitation and chewed with gusto about three times—then rejected with violence and signs of great distress. The Coati shook its head repeatedly, rubbed its jaws on the ground and with its paws.

Some three weeks later it was given another mantis, a smaller species, which it ate readily. Then a second was offered, similar in size to the first, mentioned above, but of a different species, although also cryptically coloured. This was seized and chewed as at first, and then rejected just as vehemently, with a choking motion, but the mangled remains, in this case, were taken up again, masticated afresh and finally swallowed completely, with occasional chokes. Even the body-juices were licked up. I am now of the opinion that the preliminary rejection in both cases, was due not to any disagreeable taste, but to a mechanical pricking by the exceedingly sharp spines of the fore-legs, which often pierce the collector's fingers. In the smaller species they would be weaker and more easily swallowed.

Conclusions.—The Coati is so evidently guided predominantly by scent in its hunting for and selection of food, that it is not a very suitable predator for the study of the significance of pattern and colour in association with inedibility. It will be seen from the foregoing lists that some of the insects eaten readily were metallic bronzy black, bright red and blue, and yellow and black respectively. These, of course, are generally considered warning colours. The series is probably too small for significant comparison; but the indication is that colour and pattern are immaterial to the Coati.

What is significant, however, is the high proportion of the rejected insect species

\* Dr. Myers wrote 16 September, 1930:—The fear of ants I think is almost certainly, as you suggest, due to the *smell* of the formic acid or other secretions, save in the case of *Eciton*, where the actual bites seemed also contributory.—E. B. P.



which secrete a fluid highly disagreeable to man; \* thus showing for one more predator, that such secretions or qualities associated with them, prevent their owners being eaten. It has been shown that the evil-smelling Pentatomids form a large proportion of the food of many insectivorous birds; but here, at least, is a mammalian predator which will have nothing to do with them nor other plant-bugs (COREIDAE). The Peckhams found that a spider also was deterred.

In the case of the Coati we have definite experimental evidence that odours pleasant to man are also highly agreeable to this mammal, and *vice versa*; for the Coati is a scent-fanatic, tremendously attracted to sweet-smelling or aromatic substances, which it rubs up and down along the whole length of its very long tail. We have made laboratory experiments, to be published elsewhere, on a large range of odorous substances, and found only one instance in which a smell unpleasant to us was attractive to it—and that was carbon bisulphide. Decaying nitrogenous materials, sometimes attractive to dogs, were ignored by the Coati.

It is thus interesting that, so far as insects are concerned, evil smell, and evidently an accompanying evil taste, are the only adequate defences against the Coati. Sharp spines, as in the Mantids and the large black ants (*Cryptocerus*) afford some protection. On the other hand, the stings of wasps and of scorpions and the strength and armour of large Dynastid beetles, are invariably, if somewhat gingerly, overcome.

Prof. Poulton said that it was of great interest to observe how specially protected groups of insects—such as the Lampyrid, Lycid and Meloid beetles, the Hemiptera and, to a less marked extent, the Homoptera—were recognised and refused by an insect-eating animal guided chiefly, and probably in most instances exclusively, by the sense of smell. These were groups in which conspicuous aposematic colours and patterns were present and in three Lycid beetles of two genera (T346, 1065, 1066) entered a synaposematic association like those of the African and Oriental LYCIDÆ, but even more convincing because the pattern was more elaborate. Yet, added to these warning characters appealing to the sense of sight, was a warning scent which was immediately effective as a protection against an enemy with deficient eyesight. Although the co-operation of these two modes of protection had always been recognised, together with the further warning in many instances afforded by sound, and making allowance for the highly developed sense of smell in an animal which is guided so exclusively by scent, Dr. and Mrs. Myers' experiments provided striking proofs of the efficient protection afforded by an unaided aposematic character which might be regarded as subordinate or at any rate dependent on co-operation with another class of characters.

Among the insects eagerly accepted by the Coati the conspicuous Cassidid (T338) and Hispid (1016) beetles were surprising; as also the less conspicuous Eumolpid (T341, T342) and Cryptocephalid (1018) beetles. It was to be hoped that these members of specially protected groups would be offered to other insect-eaters in order to test as far as possible their relative distastefulness. It was to be noted that the Coati at once rejected other Phytophagous beetles (1021, 1023).

\* Most LYCIDÆ are known to exude fluids on handling. Probably all those in the above lists do so; but it was not specifically observed in the present experiments.—J. G. M.

Dr. Myers had kindly presented the exhibited specimens of the insects employed in these experiments to the Hope Collection, where they can be studied by naturalists interested in bionomic research.

THE ABUNDANCE OF THE NOCTUID MOTH, *ACHAEA CATOCALOIDES*, GUÉN., IN THE BELGIAN CONGO.—Prof. POULTON exhibited seven out of the sixteen specimens of *catocaloides* sent to him by Miss Vinall and referred to in 1930, *Proc. Ent. Soc. Lond.*, 5: 64. The following interesting note recently received from Miss Vinall described their sudden appearance.

"The moths (*Achaea catocaloides*) which came out in such great numbers on 26.vi.30, were found in a road on the Mission Station adjoining the bush. They were seen clinging to a yellow fruit (like a small apple, but with a smell similar to the quince), of which there was an abundance lying in the road. The moths were evidently feeding, about ten to a dozen on each fruit, so that they completely covered it. On the approach of anyone they flew up in clouds and alighted on the bushes at the side of the road, returning again to the fruit after the interruption. I think they remained there about a week. I do not remember ever seeing them before. Had I seen even a few I should most certainly have sent you a specimen or two.—A. G. V."

"ABOABA" THE ASHANTI NAME OF A LONGICORN BEETLE BELIEVED TO PROMOTE HUMAN FERTILITY.—Prof. POULTON said that he had received a letter from Capt. R. P. Wild informing him that "Aboaba" is the Ashanti name of the Lamiid Longicorn *Ancylonotus tribulus*, F., and not a locality, as was erroneously assumed in 1929, *Proc. Ent. Soc. Lond.*, 4: 23. Capt. Wild wrote from Obuasi, Ashanti, Gold Coast, on 26 June, 1930:—

"The name of the Longicorn is 'Aboaba' in Ashanti. Obuasi is the locality. It is, however, interesting to note the beliefs of the Ashantis. My boy was very indignant when I killed this specimen, exclaiming, 'you no fit to do dat; dat fly he be good.'" It was evident that birth-control found no favour among the Ashantis!

FURTHER NOTES ON *HYPOLIMNAS BOLINA*, L., IN FIJI.—Mr. H. W. SIMMONDS said that during the last few years Prof. Poulton had very kindly presented on his behalf a certain number of notes relating to the butterfly *H. bolina* in the Pacific, and particularly to the presence of all-♀ families on certain islands of the Fiji group.

When in 1926 he was present at the October Meeting of the Society he had said that he hoped to be able to induce this insect to mate in captivity and thus to throw further light on the subject (1926, *Proc. Ent. Soc. Lond.*, 1: 29-31). He had been successful, as Prof. Poulton had reported, in obtaining pairings and found that there were present certain strains which definitely produced all-♀ families for an indefinite period (1928, *Ibid.*, 3: 43). The presence of this all-♀-producing strain would of course account for the excess of females observed by many collectors. His own observations up to August 1928 had been recorded by Prof. Poulton in the *Proceedings* (1928, *Ibid.*, 3: 44) and later notes extracted from letters to him were printed below:—

1928, *Sept.* 28.—On one afternoon recently I observed a wild ♀ paired. She

carried the ♂, and the time was 3.30 p.m., so pairing does not always take place in the morning, as generally occurred in the breeding-cage.

1929, *May* 23.—There has been a ♂ *bolina* in my garden recently and there are still a few ♀♀ about.

1929, *May* 27.—The ♂ *bolina* in my garden paired the other day and I captured them in my hands as they flew. I now have 245 eggs from the female which will form family B1. This is the largest batch of eggs I have obtained from *bolina*.

1929, *May* 29.—The pairing took place between 4 and 5 p.m. and not in the morning. The ♀ carried the ♂.

1929, *June* 19.—I also have a nice family of *bolina* B1 which should pupate this week. To-day I saw a ♀ *bolina*, which for a long while I mistook for a ♂. I also saw a beautiful brown type in my garden yesterday. Last night I observed a larva, apparently feeding upon one of my melons, an unusual host-plant if it was really being eaten. I was busy at the time and forgot to make sure later on.

1929, *July* 5.—We are having a windy and wet Dry Season. There are a few *bolina* about, and I am rearing a brood, C1 from Parent C, a yellow type from Suva. I have counted 12 ♀♀ to 3 ♂♂ observed since Saturday, but the latter may have only been two as they stay about the same spot for days and may be counted twice over.

1929, *Aug.* 9.—*Bolina* is still fairly numerous and there has again been a ♂ about my garden. My counts of ♀♀ run about 12 or 15 ♀♀ to each ♂.

In breeding these all-♀ families from the eggs of known ♀ parents, it was observed that there were always a number of eggs present which failed to hatch and it was hoped, by the study of the proportion which these bore to the whole family, to throw light on the genetic cause of the phenomenon. For this purpose far more material than had been obtained hitherto was required. In the meantime the following extracts from letters to the same friend indicated that the investigation was hopeful.

1929, *July* 26.—In regard to these all-♀ *bolina* families, there is always a large percentage of eggs which fail to hatch. The eggs can be divided into three groups: (A) fertile eggs which hatch; (B) eggs which commence to develop or at least undergo a change and die; (C) eggs which remain green and do not develop. I remember telling you that, in those families which contained both sexes, the percentage of unhatched or infertile eggs was much smaller. I am now raising Family D and find that the eggs have developed as follows:—A = 10; B = 14; C = 9.

It seems to me possible that instead of a sex dominant factor there may be a (probably sex-limited) lethal factor in the chromosomes which inhibits the development of the males.

I am sending a tube of these eggs from Parent D, and of course it still remains to be seen if those eggs which hatch prove to be all female, but the numbers of A and B suggest that B may prove to be undeveloped males. They are, I fear, too young to determine their sex.\*

\* My friend Mr. E. B. Ford examined these eggs but, as Mr. Simmonds supposed, was unable to determine the sex. He thought that Mr. Simmonds' suggestion may very well point to the solution of the problem, but that larger numbers were required in order to reach a decision.—E. B. P.



1929, Aug. 9.—I hope to have families C and D of *bolina* ready to send before I leave for Trinidad.

1929, Aug. 29.—The family of D is pupating. Some of these should emerge before I leave, but most will not. I will post what I can myself and get the chief clerk to kill, pack and send you the balance after I leave. The important point will be to ascertain whether the family of D is all-♀, as if so it will support the suggestion that the eggs which change colour and fail to hatch are normal ♂ eggs and that there is a sex-limited lethal character which is producing the all-♀ families.

1929, Sept. 3.—The family give every indication of being, as expected, all-♀.\* If this is so, the eggs consisted of three groups, A, B, and C as classified on p. 76. My suggestion is that those which changed colour are the ♂ eggs, and that there is a sex-limited lethal factor which inhibits their development. Further experiments are necessary in order to test this thoroughly.

NOTES ON A SATYRINE BUTTERFLY (*SATYRUS AZORINUS*, STRECKER) FROM THE AZORES (Pl. VI).—Commander WALKER said :—The presence of a close ally or insular race of *Satyrus semele*, L., in the Azores is a matter of great interest from the point of view of geographical distribution, when the great distance of these typically oceanic islands from the nearest continents, and the sedentary habits of the Satyrine butterflies in general, are taken into consideration. Our congratulations are therefore due to the Entomological members of the Cambridge University Expedition to the Azores in the summer of last year, on their success in tracing the mysterious "*Satyrus azorinus*" of Strecker to its head-quarters in the Islands, and in furnishing material which will probably serve to determine the true affinities and specific validity of this little-known butterfly.

A. Morelet (*Notice Hist. Nat. Açores* : Paris, 1860), and H. Drouet (*Éléments faune Açoreenne* : Paris, 1861) record the occurrence of seven species of butterflies in the Azores, all without exception common European forms; of these the only Satyrine is *Epinephele janira*, whose habitat is stated as the "Mountains of S. Miguel and Santa Maria." Mr. F. Ducane Godman, who visited the islands in the spring and early summer of 1865, in company with an expert insect collector, Mr. J. A. Brewer, did not meet with this species, though he spent some time on S. Miguel; and it is included among the nine Azorean butterflies enumerated in Mr. Godman's interesting little work *Natural History of the Azores*, 1870 (pp. 101–3) on the sole authority of M. Drouet. Even under the most favourable conditions, *E. janira* is a most unlikely insect to be able to cross a thousand miles of the open Atlantic to these small and remote islands; and it was surmised that the butterfly seen by M. Drouet on the two most easterly members of the Azorean group may be identical with the *semele*-like species recently taken on the central islands, Fayal and Pico, by the Cambridge expedition.

In the autumn of 1880 H.M.S. "Kingfisher" to which the speaker was at the time attached, made a short stay at Fayal on her outward voyage to the Pacific Station. An excursion was made to the Caldeira, the great extinct central crater of the island, and quoting from the speaker's journal of October 10th—"A single

\* Three offspring of ♀ D (captured at Suva, died 22 July, 1929) have reached me. They are females and emerged respectively on 31 August, 2 Sept., and 4 Sept. I am hoping that other members of this family may be sent when Mr. Simmonds arrives in Fiji.—E. B. P.

badly rubbed example of a *Satyrus*, related to *S. semele*, had been brought to me (by Staff-Surgeon Fleetwood Buckle, M.D.) on the previous day from the crater, where it was reported to be not rare, flying in the sunshine; but the mist effectually prevented me from seeing a specimen to-day, although I kept a special look-out for it." The spot on the edge of the crater, 3200 feet above the sea, where the butterfly was observed by Dr. Buckle, is almost certainly the exact situation where it was met with "in myriads" by Messrs. Michelmores and Kitching nearly half-a-century later.

Upon returning to England in 1884 the butterfly was given to Mr. Godman, who was unable to identify it to his satisfaction, but he, as well as Mr. O. Salvin, suggested that it might possibly be related to the genus *Oeneis*, and if such were the case, it was of great interest from a distributional point of view. Being, however, but a single specimen not in sufficiently good condition to be described, it remained unnamed until the transfer of the Godman-Salvin collections to the British Museum (Natural History), when it was subsequently placed at the head of the series of *Satyrus semele* as a dwarf insular form of that species, but now stands by itself under the name *azorinus* of Strecker.

This author (*Lepidoptera, Rhopaloceres and Heteroceres*, Supp. II, p. 3, 1899) has described a butterfly from "the Azores" as new under the name *Satyrus azorinus* as follows:—

"Body, head and antennae black. Wings dark brown. Primaries somewhat dull ochreous on the disk. A small round subapical spot between veins 5 and 6. Secondaries with a strongly sinuate dull ochreous mesial band, this has a deep sinus between veins 2 and 3, and another at vein 6. Fringe of all wings white with black at termination of veins. The disk and mesial band are not decided or well defined, but dull and suffused, as if showing through from the underside. Under surface, primaries dull pale ochre. Costa brown. The sub-apical spot of upperside is repeated, beyond this spot to the costa brown. A brown marginal band, two small white spots interior to this band between veins 6 and 8. Secondaries dark brown, somewhat striated. A mesial band as above, but pure white and sharply defined, interior to this band are two white marks, one near the base is irregular and extends from the costa to within the discoidal cell. The other nearly square is below this in the cell. Fringe as above.

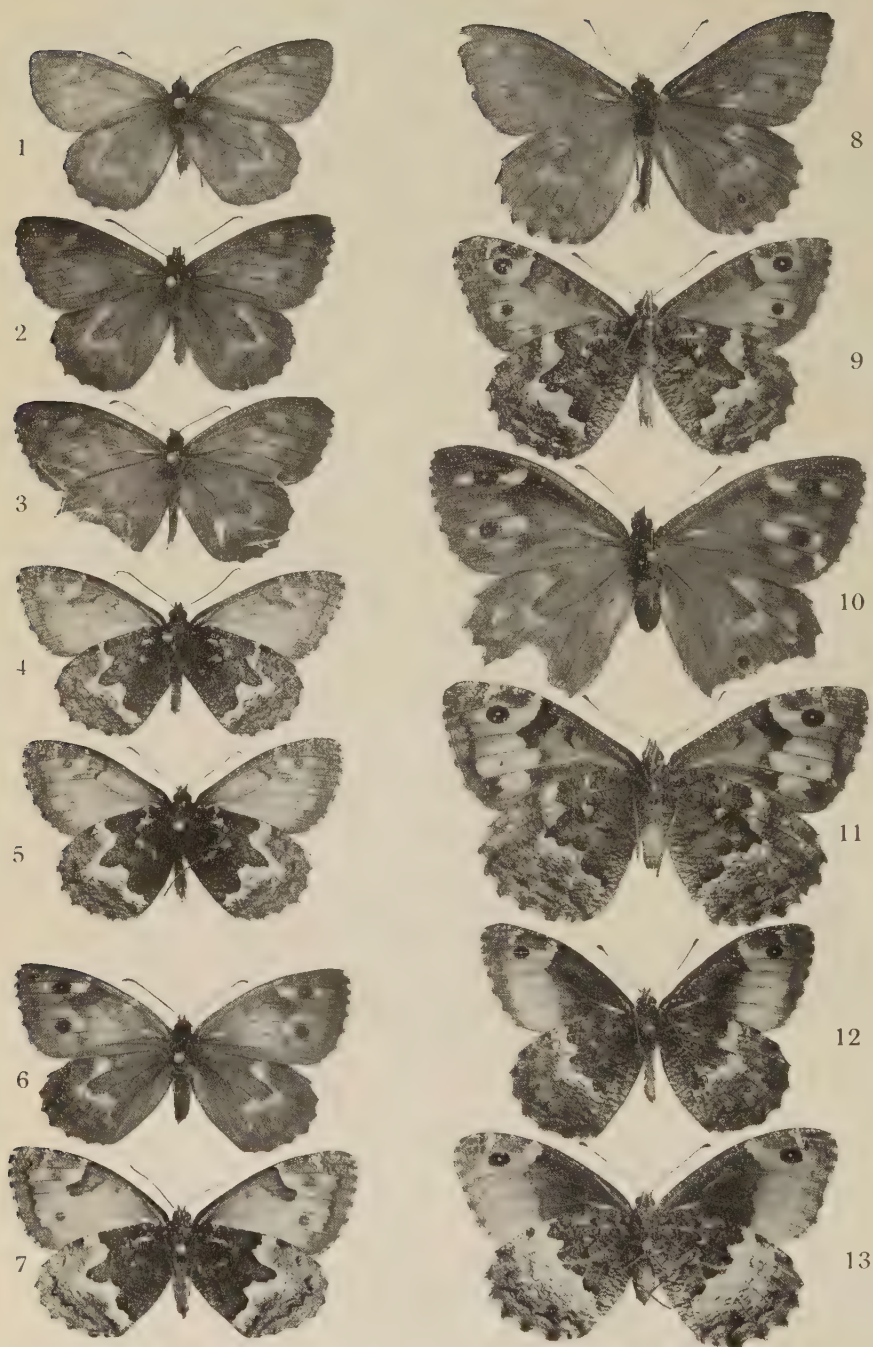
"Expands  $1\frac{1}{2}$  inches. Type, one ♂ received from Prof. E. T. Owen, who informs me it came from the Azores.

"The place for this most interesting species I think would be near *Satyrus (Chionobas) pumilus*, *lama*, etc. In a remote way it also reminds one of *S. neomyris*."

Strecker's suggestion of the apparent affinity of the Azorean insect with certain members of the genus *Chionobas* (*Oeneis*) is interesting in connection with the opinion of Messrs. Godman and Salvin above alluded to. Dr. Seitz (1909, *Macro-Lepidopt. World, Palaearct. Reg., Rhopalocera*, pp. 126-7) after stating under *S. azorinus*, Strecker, that "this insect, which is unknown to me in nature, is said to be from the Azores," further remarks, "This form, which STRECKER placed near *neomyris* [Pl. VI, figs. 12, 13, under surface], appears to be related to *alcyone*." With these two species the Azorean insect agrees though in a more pronounced degree, in the narrow and outwardly well-defined white band on the hind-wings beneath; but in other respects its affinities with *S. semele* are much more evident, though, in the opinion of the speaker, its characters are sufficiently distinctive to allow of its being recognised as a good species under Strecker's name of *S. azorinus*.







Alfred Robinson Photo.

All figures natural size.

Figs. 1—5 males; 6, 7 females of *Satyrus azorinus*, Streck., Azores; 8, 9 males; 10, 11 females of *S. semele maderensis*, B.-B.; 12 male; 13 female of *S. neomyris*, Godt., Corsica. Under surfaces in figs. 4, 5, 7, 9, 11, 12, 13.

## EXPLANATION OF PLATE 6.

All the figures are of the natural size.

FIGS. 1-3, upper; 4, 5, under surface of males of *Satyrus azorinus*, Strecker; collected by A. P. G. Michelmores, four on the top of Fayal, Azores, 1 Aug. 1929, and one on Pico, Hill E, Azores, taken a week or two earlier. The word "Pico," written in pencil which had become rather faint, was unfortunately unnoticed when the butterflies were set, so that it is now impossible to identify the specimen from this locality. The beak-marks on the wings of fig. 3 are very clearly represented.

FIG. 6, upper; 7, under surface of females of *S. azorinus*; collected by J. Balfour Browne, on Pico, Crater 14 (E), 22 July, 1929. The considerable resemblance between the male and female patterns is well shown when these figures are compared with 1-5.

FIG. 8, upper; 9, under surface of males of *S. semele*, L., *maderensis*, Beth.-Bak.; both Madeiran specimens and paratypes from the Wollaston Coll., in the British Museum.

FIG. 10, upper; 11, under surface of females of *S. semele maderensis*; fig. 10, collected by J. J. Walker in a grove of pine and oak above Funchal, Madeira (about 1200 ft.), 11 Aug. 1884; fig. 11, by G. B. Longstaff, in a garden, Caminho de Meio, Madeira, 26 July 1905. The female represented in fig. 10 is also recorded in 1929, *Proc. Ent. Soc. Lond.*, 4: 71, where the shorn hind-wings and the beak-mark (here faintly shown but just visible) on the R. fore-wing, are described.

FIG. 12, under surface of male of *Satyrus neomyris*, Godt., collected by H. C. Lang at Vizzavona, Corsica, July 1903.

FIG. 13, under surface of female of *Satyrus neomyris*, collected in Corsica by M. E. Fountaine, July 1893. From the Rowland-Brown Coll., in Oxf. Univ. Mus.

All the figured specimens are in Oxford Univ. Coll., except 7, in Coll. J. Balfour Browne, and 8, 9, in Coll. Brit. Mus.





In Madeira *Satyrus semele* occurs as the var. *maderensis*, B. Baker (1891, *Trans. Ent. Soc. Lond.*, 1891 : p. 202, Pl. XII, figs. 2, 2a). This very distinct race (Pl. VI, figs. 8-11), of which its describer remarks, "It is so uniform in coloration and so much darker than the usual type, and is so thoroughly constant, that Mr. Wollaston himself considered it to be a fixed geographical modification," recalls the Azorean insect in its almost uniformly dark-brown colour above, but is very much superior in dimensions, being equal in this respect to any of the European forms; the white band on the hind-wings beneath, though wider and more conspicuous than usual, is not sharply defined externally as in *azorinus*, but resembles in this respect, the richly-marked examples from the West of Ireland. Mr. Bethune-Baker adds, "I have been unable to trace any record of this insect from the Canaries or other Atlantic Islands."

Previous to the departure of the Cambridge University Expedition for the Azores, Commander Walker urged upon one of its members, Mr. A. P. G. Michelson, F.E.S., the importance of the rediscovery of *S. azorinus*, and indicated the exact locality where his specimen was obtained in 1880. The success of the quest is evident from the following very interesting extract from a letter written to Prof. E. B. Poulton, F.R.S., shortly after the writer's return from the Islands.

"Aug. 28th, 1929.

"I am sending you five specimens [the males represented on Pl. VI, figs. 1-5] of the Azorean Grayling, which you asked for. I fear you will think it a very inadequate series, but it comprises more than half my collection of the species. Four of the specimens are from the top of Fayal, Aug. 1st, 1929, and the other, which is labelled 'Pico, Hill E,' was taken at the latter locality a week or two earlier. We first found the insect on the slope of the volcano behind our camp at Cabeço do Afonso on the Serra Gorda on the west side of Pico. This was the 'Hill E' of our notes. When the sun shone it was pretty common on the steep grassy slope, though it always needed much patience to catch them. At first it seemed confined to this hill, but later we found it occasionally on the Serra Gorda. One or two specimens were seen higher up the mountain, 'O Pico' itself, but these were obviously stragglers. On the Serra on the S. and S.E. side of the mountain we found it much commoner, though it does occur on all the Serra country. Two of our party, J. A. Kitching and T. G. Tutin, found Satyrid larvae in or under the grass turf of the Serra, and I found one drowned in a small pool. I believe their caterpillars met with the sad fate which is liable to overtake larvae in camp, which is a pity, but we have pickled specimens. On our last day Kitching and I went up to the Caldeira of Fayal. Inside the Caldeira the butterfly was only moderately common, but on the bare Serra slope outside, on the E. side, it was in myriads, much commoner than we saw it on Pico. It was most abundant on the top 200 ft. of hill, decreasing rapidly in numbers below that.

"Unlike the Madeiran Satyrid, a species of *Pararge*, the butterfly does not occur in the woods, but only lives on open grassy Serra. It must therefore be one of the very few natives of oceanic islands whose abundance has been increased materially by human interference. We believe that there was practically no grass turf on Pico in its natural condition, but the butterfly probably managed to find enough for it to live in the higher parts of the *Erica azorea* territory, where the scrub was not too

tall. The rim of the Caldeira of Fayal is not too high and dry for grass turf, but may have been too exposed for continuous Heath or Juniper scrub. If this was the case it would have formed a good home for the Grayling, and would account for its unusual abundance there now. It is possible that it only established itself on Pico during the last 300 or 400 years, after the Serras had been cleared by burning and cutting the scrub and woods to give grazing land.

"The flight of the butterfly probably lasts from the end of June to the middle of August."

Of the ten species of Diurnal Lepidoptera comprised in the limited Azorean insect fauna, that wanderer *par excellence*, *Danaïda plexippus*, which was first noticed in the Islands in 1864 (Godman, *l.c.*, pp. 101-2) is probably no more than a casual visitor from the American Continent, though it has been recorded once at least since that date (cf. *Ent. Mon. Mag.*, 50 : 225-6). *Pyrameis cardui* and *P. atalanta*, whose migratory propensities are equally well known, appear to be common throughout the group, and with *Pieris brassicae*, were the only butterflies actually observed during the speaker's brief visit to Fayal and Flores in 1880. *Colias croceus* (*edusa*) and *Pieris* (*Ganoris*) *brassicae* were met with by Mr. Godman; the latter insect does not here present the remarkable modifications which it assumes in Madeira and the Canaries, but is similar to the ordinary European form, though perhaps slightly larger and darker in markings; *P. (Ganoris) rapae*, *P. napi*, and *P. (Synchlœ) daplidice*, were not observed by him, but are included, like *Epinephele janira*, on the authority of MM. Morelet and Drouet. These Pierine butterflies are all more or less migratory at times, and some of them at least may have long ago reached the Islands, and have become established to a greater or less extent. But how and when the Satyrine butterfly which has given rise to the present well-defined "Azorean Grayling" succeeded in attaining and colonising this distant, ocean-girt and wind-swept Archipelago, is a problem which must long await a solution at all satisfactory; but its presence there in abundance is certainly one of the most interesting facts in butterfly distribution.

Five specimens of *Satyrus azorinus* have been presented by the captors to the Hope Department, Oxford University Museum; one of these bears the very distinct marks of the beak of a finch, almost certainly the wild Canary, *Serinus canarius*, which is by far the most abundant of the three Azorean species of Fringilline birds. The remainder of the (unfortunately few) specimens brought home have also been examined at the Natural History Museum. Some of these are a little more distinctly marked with dull ochreous on the disc of the fore-wings than is the case with the practically unicolorous specimens at Oxford; in this respect the ancient Fayal example (also a ♂) collected for Comm. Walker, allowing for its worn condition, seems to correspond more closely with Strecker's description than do any of those recently captured. It is much to be regretted that the ♀ of this most interesting butterfly remains unknown, as not a single example of that sex is included in the entire series.

[Since the above notes were written, the Oxford University Museum has received a ♀ example of *S. azorinus* in fine condition [Pl. VI, fig. 6], presented by Mr. J. Balfour Browne and taken by him on Crater 14 (E), Pico, July 22nd, 1929. A little later Mr.

Balfour Browne kindly permitted me to examine two other females with the same data, one of which is represented (under surface) in Pl. VI, fig. 7. The ♀ is only slightly larger than the ♂, the subterminal pale band and the blind ocelli of the fore-wings somewhat more defined, and the central pale suffusion more extended; on the hind-wings the angulated pale band is more distinct and conspicuous. On the underside, the white band on the hind-wings is nearly or quite as well-defined as in the ♂. The two sexes are thus exceedingly similar in general appearance, and differ less from each other than is the case with any race of *S. semele* with which I am acquainted.—J. J. W.]

A COMPARISON OF THE *ICONES PAPILIONUM DIURNORUM* AND *NOMENCLATUR UND BESCHREIBUNG DER INSEKTEN* OF BERGSTRÄSSER.—Capt. A. F. HEMMING exhibited a photostat copy, recently added to the Library, of the *Icones Papilionum Diurnorum* of Bergsträsser and communicated the following notes :—

When desiring recently to consult Bergsträsser's *Icones*, I found that, of this scarce work, the British Museum (Natural History) possessed only the third volume. I ascertained, however, that Volumes I and II were in the library of the Linnean Society. Through the permission kindly accorded by those bodies, arrangements were made for photostats to be taken of the respective parts in their possession. One complete photostat copy has thus been added to the library of the Entomological Society, and in return, photostat copies of Volumes I–II have been presented by the Society to the British Museum (Natural History) and of Volume III to the Linnean Society, each of which institutions thus now possesses, either in original or photostat, a complete copy of this work.

It is now possible for the first time to make a critical comparison of the contents of these two works which Bergsträsser wrote concurrently. Each of the three volumes of the *Icones* contains a few pages of text and 10 plates. The 30 plates thus issued are also reproduced under different numbers as plates in the *Nomenclatur*. So far as I am aware, there exists no published comparison of the plates of these two works. This is given in the following table :—

Plates in <i>Icones</i> Vol. I.	Corresponding Plates in <i>Nomenclatur</i> .	Plates in <i>Icones</i> Vol. II.	Corresponding Plates in <i>Nomenclatur</i> .	Plates in <i>Icones</i> Vol. III.	Corresponding Plates in <i>Nomenclatur</i> .
Plate 1	58	Plate 1	59	Plate 1	69
" 2	55	" 2	60	" 2	70
" 3	52	" 3	61	" 3	71
" 4	56	" 4	63	" 4	72
" 5	50	" 5	64	" 5	73
" 6	49	" 6	65	" 6	74
" 7	51	" 7	68	" 7	75
" 8	54	" 8	67	" 8	76
" 9	53	" 9	66	" 9	77
" 10	57	" 10	62	" 10	78

Of the volumes published in 1779, Volume I of the *Icones* clearly precedes Volume III of the *Nomenclatur* as the latter volume contains references to the first part of the *Icones*. Volumes II of the *Icones*, which was issued in 1780, contains a number of references to the corresponding plates in Volume III of the *Nomenclatur*, published in the previous year.



Volume III of the *Icones* contains references to plates 70 and 71 of Volume III of the *Nomenclatur*, and to plates 73, 74 and 76 of Volume IV of that work. The descriptive text in Volume IV relating to plates 73–76 is contained in pp. 1–16 (*i.e.* Signatures A and B), which must have been issued prior to Volume III of the *Icones*, which is dated 1781. Volume IV of the *Nomenclatur* is dated 1780 on the title-page. The last page (page 48) is devoted to a “Nachricht,” in which Bergsträsser expresses his hopes regarding the publication of the fifth volume of the *Nomenclatur* (which, in fact, was never published), and complains of the delays that had occurred in the publication of his work. This was written from Hanau, and dated April 4th, 1783. This page forms an integral portion of the last Signature, Signature F (pp. 41–48). That Signature and also Signatures C to E (pp. 17–40) bear the following mark :—

Nomencl. 4. Jahrg. Schmett. 3 Liefr.

From this, it is clear that Signatures C to F were issued as a single part (part 3), in 1783, the date given on page 48. Signature B (pp. 9–16) bears the following mark :—

Nomencl. 5. Jahrg. Schmetterl. 4 Liefr.

This is clearly a misprint, as this Signature belongs to Volume IV, not to Volume V, which was never issued. Since Signatures C to F were issued as part 3, Signatures A and B must have formed respectively parts 1 and 2. Part 1 (*i.e.* Signature A) is dated 1780. Part 2 (*i.e.* Signature B) is not dated, but from the evidence afforded by references to its plates in the *Icones*, to which attention has been drawn above, it must have appeared before Volume III of the *Icones*, which is dated 1781. Part 2 (pp. 9–16) of Volume IV of the *Nomenclatur* may, therefore, be dated with confidence as having been published in 1780–1.

In the light of the foregoing conclusions, the dates, and order of publication, of the several volumes of the *Nomenclatur* and *Icones* may be summarised as follows :—

<i>Nomenclatur</i> I	1778
<i>Ibid.</i> , II	1779
<i>Icones</i> I	1779
<i>Nomenclatur</i> III	1779
<i>Icones</i> II	1780
<i>Nomenclatur</i> IV (pp. 1–8)	1780
<i>Ibid.</i> , IV (pp. 9–16)	1780–1
<i>Icones</i> III	1781
<i>Nomenclatur</i> IV (pp. 17–48)	1783.

No changes in nomenclature are involved by the conclusions indicated above; but the following names usually referred to as having been first described in Volume III of the *Nomenclatur* should, in future, be referred to *Icones* Volume I :—*P. argester* (p. 1), *P. argiphontes* (p. 1), *P. argyrobis* (p. 2), *P. telegone* (p. 3), *P. argopeus* (p. 3), *P. argyrophylax* (p. 4), *P. bronte* (p. 4), *P. salacia* (p. 4), *P. venilia* (p. 5), *P. pseudolus* (p. 5), *P. candaon* (p. 5), *P. thersanon* (p. 6), *P. astrarche* (p. 6), *P. arctophylax* (p. 6), *P. argyrophalara* (p. 7), *P. phobus* (p. 7), *P. oceanus* (p. 7), *P. arctophonus* (p. 8), *P. byzenus* (p. 8), *P. byzene* (p. 8).

PROTECTIVE DEVICE IN *RHODOGASTRIA* (LEP. HET. ARCTIIDAE).—MR. G. TALBOT exhibited a female of *Rhodogastria leucoptera*, Hamps., *subleucoptera*, Stnd., which formed part of a small collection of Lepidoptera made in Kenya by Mr. G. H. E. Hopkins. When captured the following note had been recorded: "This moth blew yellow evil-smelling bubbles from a pair of apertures in the thorax. It was extremely sluggish and obviously well protected." The specimen was taken at Ngong, near Nairobi, 7.vii.1928.

Similar observations, on the exudation of a yellow frothy liquid from the thorax, have been observed in species of the South American PERICOPINAE (see Seitz, *Macrolep. World*, 6 : 424; 1930, Kruger, *Ent. Runds.*, 47 : 13-14).

Prof. Poulton said that Dr. G. D. Hale Carpenter\* had also described this interesting method of protection in *R. leucoptera*.

#### *Papers.*

The following papers were read :—

1. W. H. THORPE, Ph.D. "The Biology of the Petroleum Fly (*Psilopa petrolii*, Coq.)."

2. H. D. and E. B. FORD. "Fluctuation in numbers and its influence on variation in *Melitaea aurinia*, Rott."

3. MISS ALWEN M. EVANS, D.Sc. "Observations on the predacious habits and prey of *Coenosia humilis*, Mg. (ANTHOMYIIDAE)."

### Wednesday, October 15th, 1930.

Dr. K. JORDAN, President, in the Chair.

#### *Election of Fellows.*

The following were elected Fellows of the Society :—KENNETH F. ARMSTRONG, Magdalen College, Oxford; Miss ALWEN M. EVANS, D.Sc., School of Tropical Medicine, Pembroke Place, Liverpool; and J. R. B. LOWE, R.E., Brampton Barracks, Chatham, and Sycamore Cottage, Forest Row.

#### *Exhibits.*

ABNORMALITIES IN THE PATTERN OF *HADENA PISI*, L.—DR. E. A. COCKAYNE said that at the end of September larvae of *Hadena pisi* were very abundant in one corner of Barnes Common. Amongst them were found more than sixty with abnormalities of pattern, and Mr. C. N. Hawkins found others later. At a rough estimate at least one in twenty was affected and all were in a small area. None showed a scar, and in many two or more somites, sometimes a considerable distance apart, were affected, so that it was not thought that injury could be the cause. Mr. H. Worsley

\* See his paper "Notes on the Struggle for Existence in Tropical Africa" (1913, Bedrock, Vol. II). The observation on this Arctiid Moth is also quoted in Carpenter's "Naturalist on Lake Victoria" (*Lond.*, 1920, pp. 210, 211).—E. B. P.

Wood had said that he had found similar larvae in the same place in other years. From this fact and from the frequency and character of the derangement of pattern, it was suspected that there was an inherited defect.

In no case was the segmentation abnormal and in only one was there any associated abnormality, the absence of two spiracles. Examination showed that the derangement of pattern consisted in a tendency for the two subdorsal lines to coalesce and form a dorsal loop, or for one or both subdorsal lines to unite with a lateral line, and in some the union was complete.

Fifty-three abnormal larvae from Barnes and a similar one from Esher were exhibited.

IMMENSE NUMBERS OF A LARGE MANTID AND MOTHS BLOWN ON TO A SHIP OFF THE E. COAST OF AFRICA AND OUT OF SIGHT OF LAND.—Prof. POULTON exhibited 8 males and 5 females of the large Mantis *Polyspilota aeruginosa*, Goeze, and two males of the Hawkmoth *Euchloron magaera*, L., referred to in the following extract from a letter written on 5 July, 1930, by his friend Capt. C. R. S. Pitman :—

“ I am sending herewith some material which may prove of interest. We left Mombasa in the British India s.s. ‘ Malda ’ at 6.0 a.m. on 11 May, 1930. There was a very strong south-west breeze blowing at the time. We were moving N. and the wind was obliquely off-shore and more or less behind us. Between 9.0 and 10.0 a.m. when we were out of sight of shore (a low-lying one) enormous quantities of MANTIDAE and Sphingid moths, as per samples sent herewith, and a variety of very handsome NOCTUIDAE (no specimens kept) were blown on to the boat. I kept one of the Mantids alive in an airy box without food until 2 June. All the other specimens I tried to keep alive died, apparently of excessive heat, at Port Sudan. The Pottos gorged on these Mantids and Hawkmoths to such an extent that they would not touch any more for several days, and then only an occasional one.

“ You will probably know whether either of these species is a recognised migrant form, but the general conditions between the above mentioned times suggested a migration.”

The Mantids, which had been kindly determined by Dr. R. Hanitsch and Mr. B. Uvarov, were dimorphic. Of the females, four were green and the fifth mottled grey. Of the males, four were intermediate, the grey elytra being green in the costal area and the legs also green; two darker, the green part of the elytra being marked with brown and the legs pale brown; two greatly mutilated specimens apparently resembled the grey female, but the elytra bore transverse dark markings of a much deeper shade than any upon the former specimen.

[I have now consulted my friend Mr. C. B. Williams, who has informed me that such a flight of large Mantids is, in his experience, unprecedented. Indeed he has not received evidence of mass flight by any species of MANTIDAE. It is certainly difficult, as he remarks, to understand how an overpowering wind could have made a special selection of that particular species.—E. B. P., 29 Oct. 1930.]

ADAPTIVE RESPONSE TO STIMULUS BY ANTS.—Prof. POULTON said that he had observed, when attempting to remove the workers of *Acanthomyops* (*Donisthorpea*) *niger*, L., from a much-pecked pear, by blowing strongly, that the ants rushed back



into a large cavity where each entered one of the deep crevices made by a bird's beak. Their earlier behaviour was entirely different when they were disturbed by picking the pear up from the ground; for they then began to run actively over its surface endeavouring to escape, and it was the attempt to expedite this procedure by blowing which instantly produced the effect here described, and the harder one blew the more immovable they became. The observation was made, 17 September, 1930, at St. Helens, I.W. It appeared probable that this response to the stimulus of a blast of air, tending to scatter the ants and remove them from their food or work, was often advantageous under natural conditions and had been gradually developed by the selection of favourable variations.

THE HEDGE-SPARROW FEEDING A YOUNG CUCKOO ON *PIERIS RAPAE*, L.—Prof. POULTON exhibited two photographs kindly sent to him by Mr. H. F. Chittenden, who had taken them, on 29 June, 1930, in his garden at Newlands, Seaford, Sussex. The first showed the fosterer approaching with the white butterfly very clearly seen in its beak, while in the second the food was being transferred. Both photographs showed the Cuckoo sitting on the flat top of a tree-stump. Mr. Chittenden remembered, and the photographs confirmed, that the Pierine was undoubtedly *P. rapae* and not *brassicae*. He did not see the insect caught, but observed that the whole butterfly, wings and all, was swallowed by the young Cuckoo.

In answer to the objection that the Hedge-sparrow might be offering to the Cuckoo food which it would have itself rejected, he referred to the known examples of maternal instinct in which the parent bird devoured the faeces of its young.

Mr. C. F. M. SWYNNERTON said:—"Professor Poulton's suggestion that a critic might object that the Hedge-sparrow was offering the Cuckoo what it would not have eaten itself recalls observations I made when for some days (in Rhodesia) I watched bulbuls (*P. layardi* was the species) feeding a nearly fledged nestling. The young bird occasionally refused insects brought by its parents. I believed, from the nature of some of these insects, that the refusal was due to the nestling having begun to discriminate. In most of these instances the old bird concerned then swallowed the insect itself. I was inclined to conclude that the old birds in general offered the nestling insects—sometimes 'unpalatable'—for which their own stomachs were ready. Thus nothing was wasted.

"There was also the case of a shrike—of the black-and-white African species, *Lanius collaris*. I had supplied its cage with a limited number of spikes, for its larder. On these it impaled insects, sometimes insects of species low in the scale of 'palatability,' for which it was at the time not hungry enough. Should I now give it a pleasanter insect, but still not pleasant enough for its then state of appetite, and the larder be full, it would sometimes remove and discard one of the less pleasant insects to make room on the spike for the nicer one."

OTHER ATTACKS ON BUTTERFLIES BY BRITISH BIRDS.—Prof. POULTON communicated the following observations made during the past summer by Prof. T. Bainbrigge Fletcher:—

"(1) On 18th August, 1930, at Brockenhurst, about 9.30 a.m., a Pied Wagtail was working over a lawn when it put up a butterfly. The bird made several attempts

to catch the butterfly, but the latter got away and settled in a flower-bed. It was a *Pararge megaera*, L., ♀.

"(2) On 20th August, 1930, an overcast and chilly morning, at Marlborough, in walking through a field I put up a tattered *Pieris napi*, L., ♀, which I caught, examined and liberated. It flew off slowly some thirty yards, when it was attacked by a small bird. It avoided the bird four or five times, but was caught and eaten—apparently swallowed whole, as I could not see any part of the wings projecting from the bird's beak as it flew off. There were two of these birds (? Fly-catchers), about the size of a Chaffinch, but slenderer in build, with brown head and wings and a grey breast; they were sitting on a wire fence and swooping down over the field, evidently catching small insects.—(T. B. F.)"

He had consulted his friend Mr. B. W. Tucker who agreed that the birds were certainly Fly-catchers.

BRITISH LEPIDOPTERA BEARING EVIDENCE OF BIRD-ATTACK.—Prof. POULTON exhibited the following specimens on which beak-marks were distinctly visible :—

*Epinephele jurtina*, L.—Two males, taken this year by Prof. T. Bainbrigge Fletcher at Shanklin, I.W., had evidently been attacked when the wings were expanded, probably in flight but possibly when settled. One male (July 6) had been seized from behind by a largish, rather broad-billed bird. The beak-mark nearly crossed both right wings at their broadest part, invading the anal area of the hind-wing and nearly reaching the fore-wing costa. The tip of the bill had severed both sides of a triangular portion which only remained attached to the fore-wing by its base. The second male (July 10) had been attacked, also on the right side but from the front. There were two distinct beak-marks, one crossing the centre of the fore-wing with the tip extending well into the hind-wing, the other passing obliquely across the apical section of the fore-wing and terminating a little above the anal angle. The outer side of the mark passed through the apical ocellus.

*Asthenia blomeri*, Curt.—An example of this little Geometrid moth, captured by Mr. C. N. Hawkins, 12 July, 1930, at rest on a beech-trunk at Cheney's, Bucks., showed a little distance within the outer margin of the L. fore-wing the imprint of a slender beak. The attack had been delivered from behind and the tip of the bill nearly reached the costa. A mark on the apical area of the L. hind-wing was probably made by the same bite. The fore-wing also bore another beak-mark nearly exactly super-imposed on the other, and this may have been made by a bite which had cleanly shorn off the rounded outer margin of the L. hind-wing. These marks, which were clearly visible on holding the insect up to the light, proved that small moths with slender bodies providing but little food, may be subject to persistent attacks.

BRITISH ASILIDAE (DIPTERA) AND THEIR PREY.—Prof. POULTON exhibited two interesting examples of these predacious insects with prey captured by his friends Mr. H. M. Edelsten and Col. F. A. Labouchere.

*Asilus crabroniformis*, L., ♀, with *Lycaena corydon*, L., ♂.—Mr. Edelsten had kindly written the following account of the Asilid's behaviour towards this, the first recorded Lepidopterous prey of the species.

"On Aug. 30, 1930, while watching *corydon*, on the Sussex Downs, a male settled on the dwarf thistle (*Cnicus acaulis*). Almost immediately the Asilid sprang on it, and held the *corydon* down with its fore-legs. They struggled for a moment, when the *corydon* was turned over and the Asilid thrust its proboscis into the butterfly's thorax. The Asilid must have been waiting on the ground close to the thistle. It did not take the butterfly on the wing. The *corydon* lived for about half an hour after being pierced by the proboscis."

*Machimus rusticus*, Meig., ♀, with *L. corydon*, L., ♂. Mr. J. E. Collin agreed with Mr. B. M. Hobby's identification of this extremely rare Asilid as *rusticus*. Col. Labouchere had kindly described the circumstances in which it was taken with its prey, 24 August, 1930, on the Sussex Downs :—

"My attention was caught by something grey on the grass some way off and, on approaching it, I saw it was a ♂ *corydon* on its back and closer examination showed that it was the victim of a fly which was holding it and apparently sucking its juices, its head buried in the butterfly's thorax. As I watched, a wild Salsify (?) seed was blown against the pair. This evidently disturbed the fly, which proceeded to drag the *corydon* away over the grass for about a foot and then settled down again to its meal. I did not see the attack which must have taken place only a few minutes previously, as when I first saw the *corydon* there were feeble signs of life."

Prof. Poulton also brought from the Oxford University Collection and exhibited another female *rusticus* with prey—the beetle *Dascillus cervinus*, L., ♂, from Sondrio, N. Italy, 29 June, 1901.\* An allied but distinct *Machimus*, probably *basalis*, Lw., ♀, taken with its prey, *Pyrameis cardui*, L., ♂, by Dr. T. A. Chapman in W. Central Spain, July 1902, was recorded in 1907, *Trans. Ent. Soc. Lond.*, 1906 : 354.

Mr. B. M. Hobby said that the *Asilus crabroniformis* with butterfly prey was the first of its kind that had come to his notice. He had up to the present time found 63 records of prey taken by this Asilid, viz.—Diptera—36, Coleoptera—11, Orthoptera—10, Hymenoptera—5, Lepidoptera (the exhibited specimen)—1. Many other large Asilids were well known to take butterflies as prey, the African records being especially plentiful. In the genus *Asilus* itself, excluding *crabroniformis*, he had found that the observed instances of prey—thirty in all—were represented by the numbers of specimens in the following groups :—Lepidoptera—12, Diptera—8, Hymenoptera—6, Coleoptera—1, Hemiptera—1, Paraneuroptera—1, Neuroptera—1.

Dr. E. A. Cockayne said that, on 17 August last, near Leatherhead, he had seen *Asilus crabroniformis* carrying a light-coloured moth. It settled on a path with its prey. He had no net, but tried to box it three times and once nearly succeeded. He was unable to get a good view of the moth and was not sure whether it was a Noctuid, Geometer, Crambid or Pyrale—probably one of the last three.

\* This example of *rusticus* has been determined by the late Dr. Bezzi. The name of the captor cannot be inferred from the labels on the specimens.



A REMARKABLE VARIETY OF *EPINEPHELE JURTINA*, L.—Mr. B. M. HOBBY exhibited a male *E. jurtina* which he had taken on the chalk at Farley Mount near Winchester, 24 Aug. 1930. Normal brown scales were present along the veins of all four wings, while the areas between the veins were white. The insect thus presented a beautifully rayed appearance remarkable because of its symmetry. A less advanced variety of the same type was figured in Barrett's *Lepidoptera of the British Islands*, Vol. I, Plate 33, fig. 1*d*.

*BLASTOBASIS LIGNEA*, WALSM., IN SUSSEX.—Mr. ROBERT ADKIN exhibited specimens of the Tineid moth *Blastobasis lignea* which he had taken in his garden at Eastbourne between the 10th July and 11th August last. They were all found tucked away in crevices of the bark, on the stems of three sycamore trees that grow on a terrace in the garden. The only previous British records were from Lancashire, 1922, *Entomologist*, 55: 145 (Grange-over-Sands and Witherslack). The species was described by Walsingham from specimens taken in Madeira 1894, *Trans. Ent. Soc. Lond.*, 1894: 550, and it had also been recorded from Eastern Australia.

Mr. O. W. RICHARDS pointed out that the late Prof. E. G. R. Waters had shown that Prof. Poulton had taken *Blastobasis lignea* in N.E. Ireland in 1902 (1928, *Proc. Ent. Soc. Lond.*, 3: 32).

A NOTE ON THE HABITS OF *AUGIADES SYLVANUS*, ESP. (HESPERIIDAE).—Mr. O. W. RICHARDS said the following observation was made at Ferleiten, Salzburg, Austria, on the 3rd July, 1930. A specimen of *Augiades sylvanus*, Esp. (kindly determined as a male by Mr. N. D. Riley) had repeatedly settled on his hand, especially on his thumb. While settled it bent its tail up under its abdomen and exuded a small drop of clear fluid, which it placed on his hand at a point not far from its proboscis, with the aid of which the fluid was immediately sucked up. On one occasion it perched continuously on the thumb for about a minute, during which period six drops were exuded, the tongue being kept extended the whole time. The day was dull and rainy. It was understood that similar observations had been made on African Hesperiiids, in which the habit is supposed to be due to a need for salts, which are obtained from dried perspiration.

Prof. POULTON said that so far as he was aware this behaviour of the HESPERIIDAE was first recorded by Mr. J. C. Kershaw in 1907 (*Butterflies of Hongkong*, p. 129) and since then by many observers (*Proc. Ent. Soc. Lond.*, 1913: xl; 1916: lxxx; 1917: lxxvii).

Mr. J. A. SIMES, referring to butterflies settling on clothes damp with perspiration, said that in September, 1929, when they were picnicking on the slopes of Bembridge Down near Yaverland, I.W., numbers of ♂♂ of *Satyrus semele* were prone at first to alight on the clothing of members of the party, but mainly on the clothing of himself and his son (who had been collecting somewhat energetically).

Wednesday, November 5th, 1930.

Dr. A. D. IMMS, F.R.S., Vice-President, in the Chair.

*Election of Fellows.*

The following were elected Fellows of the Society :—ALBERTO BREYER, Florida 414, Buenos Aires, Argentina; ADOLFO BREYER, Jr., Florida 414, Buenos Aires, Argentina; PETER BAINBRIDGE FLETCHER, 65, Compton Road, Wimbledon, S.W.; SEBASTIAN M. B. HARDWICKE, Friarmayne, near Dorchester; R. J. A. W. LEVER, 12, Oppidans Road, Hampstead, N.W.3; GILBERT H. MANSBRIDGE, Imperial College of Science, S.W.7; C. POTTER, B.Sc., Imperial College of Science, S.W.7; D. W. SETH-SMITH, M.R.C.S., L.R.C.P., Accra, Gold Coast; FRANK A. TURK, F.Z.S., 18, Fernside Road, Balham, S.W.12; Prof. H. BECKWITH WHITEHOUSE, Greyfriars, Pritchatts Road, Edgbaston.

*Exhibits.*

*HELICONIUS CHARITHONIA* AND ITS MIMICS IN COLOMBIA, VENEZUELA, COSTA RICA, CUBA AND HAITI.—Mr. W. J. KAYE exhibited mimetic series of specimens from Colombia (Muzo), Venezuela (Caracas), Costa Rica (Pejevalle), Cuba and Haiti to illustrate how *Heliconius charithonia* is mimicked on the mainland by the small black and yellow Ithomiine *Aeria eurimedia agna*, whilst in Cuba and Haiti the females of *Dismorphia* spp. (*D. cubana* and *D. spio*) closely follow the colour and pattern of the *Heliconius*. In Cuba, Haiti, Jamaica and Porto Rico no species of the Ithomiine genera *Melinaea*, *Mechanitis* or *Ceratina* exist, so that, instead, the species of *Dismorphia* in the female sex have gone after the abundant *H. charithonia*, while the males bear a rough resemblance to the species of *Eueides* found there. In the case of Cuba the male *Dismorphia cubana* goes after *Eueides isabella cleobaea*. In the case of Haiti the male *Dismorphia spio* goes after *Eueides isabella melphis*. In Jamaica *H. charithonia* has no possible mimic, as there are no Ithomiines except the transparent *Hymenitis diaphanus* and no species of the genus *Dismorphia*. In Porto Rico no record had been found of a *Dismorphia*, so it is most likely that, as in Jamaica, *H. charithonia* has no mimic there. The absence from the Antilles of the Ithomiines has had a most marked effect on species in other genera and families that were invariably found associating with, and imitating, them throughout the tropical area of Central and South America. In Cuba and Haiti there are species of *Lycorea* and *Eueides* that do not in the least correspond with one another, doubtless because there are no abundant Ithomiines to set the pattern. In Cuba *Lycorea ceres demeter* is dark and usually very suffused in the hind-wing, and one might easily confuse the form with *cinnamomea* from Teffé on the Amazon and on the Rio Madeira. The *Eueides isabella cleobaea* is rather distinctive but strongly like the Central American form *E. isabella zoreon*. In Haiti *Lycorea ceres cleobaea* is strongly reminiscent of the S. Brazilian form *halia* with a well-marked yellow transverse band in the cell, while the *Eueides isabella melphis* has the characteristics of the Peruvian *E. isabella hippolinus* with an entire suppression of yellow by orange brown. Gundlach in "Contribution à la Entomologia Cubana" refers to the resemblance of the male of

*Dismorphia cubana* to *Eueides cleobaea* as well as to the resemblance of the female *Dismorphia* to *H. charithonia*. The male resemblance is not very close in some specimens, while the female resemblance is remarkable. Mention was made of the females of certain species of *Catonephele* that were sometimes claimed as mimics, such as *C. nyctimus* in Central America and Northern S. America, *C. antinöe* and *C. acontius* in the Guianas and the lowlands of the Amazon region. In the former case *H. charithonia* could often be found with *C. nyctimus*, but no resemblance could be claimed. The other two species, *C. antinöe* and *C. acontius*, occurred in the vast area of the Amazon and the Guianas, where *H. charithonia* did not occur. It might easily be that the females had a general pattern for concealment and inconspicuousness generally.

The accompanying table shows the arrangement of all the species exhibited, and it will be observed that there is the curious occurrence of *Lycorea* forms in both Cuba and Haiti without any close association of any other species in different genera.

TABLE.

COLOMBIA.	VENEZUELA.	CUBA.	HAITI.	JAMAICA.	COSTA RICA.
<i>Lycorea ceres</i>	<i>Lycorea ceres</i>	<i>Lycorea ceres</i>	<i>Lycorea ceres</i>	(absent)	<i>Lycorea ceres</i>
<i>atergatis</i>	<i>atergatis</i>	<i>demeter</i>	<i>cleobaea</i>	(absent)	<i>atergatis</i>
<i>Eueides isabella</i>	<i>Eueides isabella</i>	<i>Eueides isabella</i>	<i>Eueides isabella</i>	(absent)	<i>Eueides isabella</i>
<i>hubneri</i>	<i>hubneri</i>	<i>cleobaea</i>	<i>melpis</i>	(absent)	<i>hubneri</i>
<i>Mechanitis</i>	<i>Mechanitis</i>	(absent)	(absent)		<i>Mechanitis</i>
<i>polymnia</i>	<i>polymnia</i>				<i>polymnia</i>
<i>doryssus</i>	<i>doryssus</i>				<i>doryssus</i>
		♂	♂		
<i>Dismorphia</i>	<i>Dismorphia</i>	<i>Dismorphia</i>	<i>Dismorphia</i>	(absent)	<i>Dismorphia</i>
<i>amphione</i>	<i>amphione</i>	<i>cubana</i>	<i>spio</i>		<i>amphione</i>
<i>astynomides</i>	<i>astynomides</i>				<i>arsinoides</i>
		♀	♀		
<i>Aeria euri-</i>	<i>Aeria euri-</i>	(absent)	(absent)	(absent)	<i>Aeria euri-</i>
<i>media agna</i>	<i>media agna</i>				<i>media agna</i>
<i>Heliconius</i>	<i>Heliconius</i>	<i>Heliconius</i>	<i>Heliconius</i>	<i>Heliconius</i>	<i>Heliconius</i>
<i>charithonia</i>	<i>charithonia</i>	<i>charithonia</i>	<i>charithonia</i>	<i>charithonia</i>	<i>charithonia</i>

REMARKS ON *P. MACHAON*.—MR. L. W. NEWMAN exhibited a long series of *P. machaon* bred in 1930 from ova obtained in captivity from Norfolk Broads stock. The specimens, being selected forms from over 2,000 bred, showed considerable variation in depth of border, amount of blue in hind-wings, and apical spotting. The series included two specimens of the black aberration and some abnormal undersides with intense red lunules.

*DIANTHOECIA CARPOPHAGA* FROM SUSSEX AND THE S.E. COAST.—MR. H. J. TURNER, on behalf of Mr. A. J. WIGHTMAN, exhibited a very long series of *Dianthoecia carpophaga*, and communicated the following note :—The exhibit shows the extremes of variation which obtain in one species of common ground-frequenting moths even in a restricted area. Nearly all the insects in the series were bred from Sussex and Kent coast larvae and pupae (pupae chiefly), so that size was certainly normal and no shade of colour due to worn specimens. The ground-colour varies from pure white, through bone white and cream, to pale ochreous. The markings from palest ochreous, rich ochreous, deep ochreous, fuscous, pale brown, to deep brown, and in some specimens ashy grey is present usually as a second colour in the markings. No relative proportion or percentage of variation can be taken as the specimens are picked from some thousands bred.



REMARKS ON "JUMPING BEANS."—Mr. J. C. F. FRYER said that it is well known that the seeds of various plants, when inhabited by certain species of insects, are caused to "jump" by the movement of the insect inside. The classic case is that of the so-called "jumping beans" of Mexico, which are the seeds of species of *Sebastiana* and *Colliguaya*, the insect responsible for the movement being a Tortricid moth, usually said to be Westwood's *Carpocapsa saltitans*. The seeds exhibited were kindly determined by the authorities at Kew as those of *Sebastiana palmeri*, usually known as the "Rose of Mexico."

The method by which the larvae inside the seed causes the latter to move has been described by various writers—as, for instance, by Rollo, 1905, *Ent. Mon. Mag.* **16**: 158—and this aspect of the matter is fairly well understood. The reasons for the movement are, however, less clear. It has been suggested that it may be an attempt to escape from enemies, a suggestion which, however, is untenable, both because the larva in the seed cannot tell when an enemy is present and also because if the seeds are touched movement at once ceases. A more probable explanation is that the powers of jumping are required in order to enable the insect to move the seeds out of the sun. Apparently the plant grows in dry rocky places, and if a seed should fall on the bare rock it is possible that the insect inside would be killed by heat if it were unable to move to a more protected position.

AN ITHOMIINE BUTTERFLY AND ITS HELICONINE MIMIC TAKEN FLYING TOGETHER IN N.W. PERU.—Prof. POULTON exhibited five examples of *Tithorea pavonii*, Butl. (1 ♂ 4 ♀) and four of *Heliconius charithonia peruvianus*, Feld. (1 ♂ 3 ♀), captured by his friend Mr. H. F. Slattery, flying together in the forest by the Quebrada Angostura stream, a branch of the Tumbes River, in June 1929. The synaposematic association of numerous Heliconines and Ithomiines—the latter, with very few exceptions, as the models—was well known on the eastern side of tropical S. America, extending to the head waters of the Amazons, but less known on the western side. He was especially pleased to exhibit this striking example of model and mimic flying on the same days in the same forest.

FURTHER EXPERIMENTS WITH INSECT-FOOD ON THE AFRICAN LEMUR *PERODICTICUS POTTO*, LESSON, BY CAPT. C. R. S. PITMAN.—Prof. POULTON said that his friend Capt. Pitman had written, 6 June, 1930, enclosing the following additional notes of experiments on the Pottos, in continuation of those recorded in 1929, *Proc. Ent. Soc. Lond.*, **4**: 90, 91. The lemurs had now been presented to the Zoological Society.

*Further Notes commenced 7 Oct. 1929.*

I. VEGETABLE FOOD.—No further notes.

II. ANIMAL FOOD OTHER THAN INSECTS.—The male continued to take raw liver freely and to eat the fresh eggs of small birds up to thrush size, but they have to be cracked for him. The female has taken no interest in either of these foods.

III. INSECT FOOD.—(a) *Various Orders*.—Dragonflies and Diptera accepted by both sexes as recorded in the earlier notes. Also all types of butterflies that were offered, including HESPERIIDAE. Both gorge on winged Termites but speedily attain

repletion and then won't touch any for several days. A surfeit of this food scours them out badly.

(b) COLEOPTERA.—The male eats a large, heavy, brownish "Rhino" beetle with single long horn. This insect is over an inch in length and half an inch in breadth.\* Both sexes refused the huge evil-smelling Dung-beetles; also the smaller species which are equally evil-smelling.

(c) ORTHOPTERA.—(1) ACRIDIDÆ.—Both sexes gorge on locusts and then refuse them for several days. The male took dirty brown grasshopper (?)—a large blunt-headed, wingless, evil-smelling, screaming and frothing insect. [This insect was probably an Acridian allied to *Dictyophorus laticincta*, Walk., which Dr. G. D. Hale Carpenter offered to his monkey. See 1913, *Proc. Ent. Soc. Lond.*, 1913: xcvi, xcvi, on which the following shorter account was based. "While he held it in his hand the grasshopper emitted copious bubbles of strongly smelling yellow froth from the thoracic spiracles, forcing it out by first distending and then strongly contracting the abdomen, so that a hissing sound was produced, audible several yards away." The grasshopper was tasted and pulled to pieces by the monkey, but none of it actually eaten. (*A Naturalist on Lake Victoria*, London, 1920, p. 210.)]

(2) TETTIGONIIDÆ.—Both devoured the "Ensenene" (*Homocoryphus vicinus*, Walk.) and then refused them for days.

(3) GRYLLIDÆ.—Both sexes accept with avidity the huge, repulsive mole-crickets, which can bite fiercely.

(4) MANTIDÆ.—As already recorded (see p. 84), both sexes on board ship (11 May) gorged on Mantidea and Sphingid moths, but then would scarcely look at them for many days.

(5) BLATTIDÆ.—Both sexes eat freely all types of cockroaches.

#### *Additional Note (19 Oct. 1930).*

Some small biting ants got into the Pottos' cage one day with some fruit. I particularly noted one ant (total length about  $\frac{1}{8}$  inch), with heavy mandibles, fastened in the hand (palm) of the male Potto who was evidently in pain. The Potto knew the cause of the pain, but neither attempted to *pick off* the ant with its other hand, nor yet *bite off* the assaulting insect.

From time to time it vainly shook its hand in a sort of appealing effort to get rid of its tormentor. I had not the time to wait and see how it eventually got rid of the ant, which when I left was hanging on with bull-dog tenacity.

FURTHER NOTES ON THE CATERpillars EATEN BY THE NATIVES AT BONGANDANGA, BASANKUSU, BELGIAN CONGO, BY MISS GERTRUDE VINALL.—Prof. POULTON said that he had received a large amount of material and many notes, greatly extending the record of observations published in the earlier pages (viz. 8-13, 44, 45) of the present volume of *Proceedings*. In determining the moths he had received kind help from his friends Lord Rothschild, Dr. Karl Jordan and Mr. W. H. T. Tams, and with the trees from Dr. A. D. Cotton, Keeper of the Kew Herbarium. The results were arranged according to the groups to which the edible larvae belonged. The specimens named were exhibited to the meeting.

\* Mr. G. J. Arrow has kindly written 26 Nov. 1930:—"I have no doubt that Capt. Pitman's beetle was a male *Oryctes boasi*, F. It is very common and we have examples from Uganda."

## RHOPALOCERA : NYMPHALINAE.

*Cymothoe caenis*, Drury,—“Besankele.” The fact that the caterpillars of this butterfly were eaten by the Natives had been already recorded (1930, *Proc. Ent. Soc. Lond.*, 5: 45). Six examples of *C. caenis* bred from Besankele larvae were exhibited to the meeting. Of these 2 ♂ and 2 ♀ emerged on May 31, 1 ♂ on June 1, 1 ♀ on June 2. All had become chrysalides on May 26, so that the pupal period was extremely short—from 5 to 7 days.

Extract from Miss Vinall's letter of 31 May 1930 :—

“To-day I have been able to prove that the *Cymothoe caenis* is the same as that named ‘Besankele’ by the Mongo people and that it is edible as a caterpillar. It is eaten very generally by both men and women, though some do not like it because of its slightly bitter taste. Also they tell me that if it is not cleaned out properly inside, before cooking, it causes frontal headache, or as they would say ‘headache in their spirit,’ as these Natives think the ‘Bolimo,’ which is their word for spirit, lives in the front of their forehead, between the eyes. I once had a little boy brought to me at the dispensary who had been bitten by a dog in the centre of his forehead, and a small piece of flesh was hanging which I wanted to remove with the scissors. ‘No, no, don’t do that,’ said his mother, ‘his spirit will depart from him if that is cut away.’ I was out on May 21st this year looking for specimens, when my boy showed me some small eau de nil shade of green caterpillars which he said were Besankele caterpillars and edible, and that they would turn into white butterflies also named Besankele. I brought seven home which had fallen on the ground, evidently ready to pupate, and put them into my cupboard; six turned into chrysalides on May 26th—four a delicate shade of pink, and two pale green. From these, four *Cymothoe caenis* have emerged to-day, probably the others will be out to-morrow, so this proves that there is one species of butterfly eaten as a caterpillar by the Mongo people.

“P.S. I am also enclosing with this letter some leaves from the tree ‘Bosaaki’ on which the Besankele caterpillars feed.”

The leaves, some of which were very large and in shape recalled those of *Paulownia imperialis*, were submitted to Dr. A. D. Cotton, who kindly wrote 30 July, 1930 :—

“‘Bosaaki’—Probably a species of *Thespesia* (Malvaceae), but indeterminable in the absence of flowers or fruits. I shall be very glad to have examples of these.”

Miss Vinall, writing 4 Nov. 1930, described this food-plant as “more of a shrub than a tree, as I was able to take the larvae as I walked along the path in the forest, but as the sides of the path are frequently cut down it may have been new growth.”

The discovery of the larvae and food-plant of this butterfly was of great importance, as it would almost certainly throw light on the causes which determine the migratory flight of the species.

## HETEROCERA : SATURNIIDAE.

*Nudaurelia rhodophila*, Walk., ♂ —“Elima.” All the notes within quotation marks, following this and other species were copied from Miss Vinall's manuscript on the enclosing “papers,” letters, or separate sheets.

“There are two kinds of caterpillar called ‘Elima’ here. This one has an all-



yellow larva; the other is black with yellow spines. The former feeds on Mango trees. This caterpillar, taken 21.v.30, covered itself in the earth in pupal state, 26.v.30, and emerged 23.vii.30." The larval skin and pupa-case with date 23.vii.30 and name "Elima" were also present.

A ♀ Saturniid moth which emerged amid the cotton-wool in one compartment of a box containing pupae and larval skins was much crumpled and broken. After Mr. Hamm's skilful manipulation it was, however, possible to determine the species as *Nudaurelia rhodophila*. The ♀ pupa-case, larval skins of two examples, and eggs laid in the compartment were labelled "Elima. Yellow with spines but darker shade than No. 1, almost light fawn. Caterpillar, 26.v.30, covered itself in earth 27.v.1930. Trees—Bofeko, Bosengi, Lifaki."

*Nudaurelia dione*, F., 2 ♂—"Elima" (*ibid.*, p. 12). Probably the second form of Elima, mentioned above.

*Nudaurelia anthina*, Karsch, ♀—"Entente." "Edible caterpillar, 28.vii.1930, 'Entente.' Pupated in box."

*Nudaurelia* sp. ♂—"Linkonju." "No. 8—'Linkonju.' Caterpillar black with rings of yellow spots. Started to pupate 3.ix.29; emerged imperfectly 9.v.30. This is edible as caterpillar." (Miss Vinall's notes on No. 8, spelling the name "Likonju" with the plural "Bakonju," gave dates agreeing with the above, but described the edible black caterpillar as having "stripes of yellow spots," and stated that it feeds on the Bomposo and Boonga trees.)

*Nudaurelia* sp., probably ♀ of *aethiops*, Rothsch.,—"Etete" (plural "Litete"). "Edible by all. Caterpillar green with red spines; started to pupate 5.viii.1929; emerged 10.vii.1930. Feeds on 'Bomposo' tree." Larval skin and pupa-case also sent, labelled "Etete" and with emergence 10.vii.1930.

*Imbrasia epimethea*, Drury, ♀—"Likanga" (*ibid.*, p. 44).

*Bunaea thomsoni*, Kirb.,\*—"Ebuluku" (*ibid.*, p. 12). Probably a form of *phaedusa*, Drury, but not *phaeax*, Druce, as quoted on p. 12, referring to a ♀ *thomsoni* bred from an Ebuluku larva. A second female, received later, was dated 25.v.1930, and bore the note, "Is this 'Ebuluku' as sent with edible caterpillars last year? If so, it is edible as a caterpillar."

*Bunaea eblis*, Streck., ♂, ♀—"Entente" (sing.), "Lintente" (plur.). The male "Pupated on 16.viii.1929; emerged 29.vi.1930. Edible as caterpillar." The ♂ pupa-case and larval skin were labelled "Entente." The female "started to pupate 17.vii.1929; emerged 24.iv.1930. Hatched out from edible caterpillar. I think the name is 'Lintente.'" The ♀ pupa-case was labelled "Lintente" with date of emergence as above.

Miss Vinall's note on "Lintente," the dates agreeing with those above, stated that the larva was eaten by the Mongo people. The note continued—"I am afraid to speak of this name [Lintente] and dates with certainty, fearing lest the Native I left in charge of the larvae during my absence from the Station, should have moved the tins from their respective labels, but my boys verified this as 'Lintente,' from the caterpillar skin. It feeds on the Bosombo Tree."

"Biona" and "Bet'eto" were the names of two other edible Saturnian larvae as

\* *Trans. Ent. Soc. Lond.*, 1877: 19.

yet undetermined. The green pupae of *Biona* are referred to on p. 96. The unpleasant odour of *Bet'eto* was considered by Miss Vinall perhaps to have been derived from the evil-smelling "Bomposo" Tree (*ibid.*, pp. 10, 11). The *Bet'eto* caterpillars were described by her as dimorphic—flesh-pink and black. Three, not quite full-grown—one pale, two dark—sent in spirit, were certainly Saturnian larvae, with spines represented by tubercles. It was greatly to be hoped that both *Biona* and *Bet'eto* would be bred and identified.

The Bomposo was described by Miss Vinall as a very tall tree which has to be climbed by Natives to collect the larvae. Specimens were kindly sent with a letter of 31 May 1930:—"I am sending you the leaves of the tree 'Bomposo' (Native Mongo name) also its flower and seed-pods. I am sorry I have not a better specimen of the flower, but I am dependent upon the Natives to get it for me, as they have to climb the tree, and they do not seem to understand just what I require; however, this may be enough for identification. The Natives tell me that the flowers lying on the ground emit a very unpleasant smell when wet with rain. The Native names of edible caterpillars feeding upon Bomposo tree are as follows:—*Bet'eto*, Linkonju (sing.), Bakonju (plural), Linkekele, Ebuluku, and Loko."

From the specimens received the tree has been kindly determined by Dr. A. D. Cotton:—

"'Bomposo'—*Petersia africana*, Welw. The genus is a monotypic member of the Myrtaceae.

"*Petersia africana*, Welw., is one of the 'stink-woods.' When bruised the young branches emit a foetid smell. It is described as follows:—'A tree 20–30 m. high, 70–90 cm. diam.; heartwood pale red, well veined and speckled, fine grained; sapwood yellowish white. The wood is too heavy and hard to pass as a substitute for mahogany, and not hard enough, and too porous, for tools.'"

#### NOTODONTIDAE.

*Alenophalera variegata*, Auriv., ♀—"Nkulanjembo." "Pupated 19.vii.1929; emerged 14.viii.1930." The pupa-case in earthen cocoon with similar data except that the emergence was accidentally given as July 14.

A bred series of this moth would be very interesting in throwing light on the relationship between some of the named forms in this genus. A male *Alenophalera inconspicua*, Gaede, with the same Native name "Nkulanjembo" was exhibited at the February meeting (*ibid.*, p. 12).

*Anaphe panda*, Butl.—"Belanga." Seventeen moths from the cocoon spun, August 1929, in an old tea-tin, as already described (*ibid.*, pp. 10, 11, 44, 45), emerged between 4 and 24 May 1930. All were of this species. Six moths which emerged later from the same cocoon—four on July 26, two on July 27—were also received, together with parasitic Tachinid flies which would be investigated in the near future.

#### LASIOCAMPIDAE.

*Mimopacha knoblauchii*, Dew., ♀—"No. 10. Edible larva. Query name 'Biona' or another name for the same caterpillar 'Besaka.' Em<sup>d</sup> in my cupboard 18.v.1930."

Miss Vinall's notes, agreeing with the above Native names and date, further stated—"No. 10 Moth. Fawn with small round pale pink spot on upper wing. It laid little green eggs. If this is Biona (?) the chrysalis is green like fresh grass and is used by Natives as bait for fish: the caterpillar of Biona is a reddish fawn and feeds on Bosengi, Lifaki, Lokoola, and Boona trees. The above is true of the Biona caterpillar which is also eaten in the early stages of pupation, but whether this moth is from the Biona caterpillars I am not quite sure."

It was clear from this description that the caterpillar is not Biona, for this name was given to some beautiful green living pupae brought by Miss Vinall which are certainly SATURNIIDAE. It was hoped that one or more of the pupae would produce moths and enable us to determine the species. Without further confirmation it was uncertain whether the Lasiocampid larva of No. 10 was edible or whether it or its pupa had been accidentally introduced with the food-plant.

A HITHERTO UNIQUE FLY (DIPTERA: TACHINISCIDAE) AND A PUZZLING COCOON FROM THE BELGIAN CONGO.—Prof. POULTON said that he had received from Miss Vinall a remarkable fly which had "emerged in a cupboard containing pupae of edible caterpillars," at Bongandanga, Basankusu. The insect, a male, unfortunately in poor condition, had been determined by Major Austen and Sir Guy Marshall as *Anthophasia* (*Tachinoestrus*) sp. nr. *fenestratus*, Grünb., of which there were three examples from Sierra Leone in the British Museum Collection, also a single specimen of the Peruvian *Tachinisca cyaniventris*, Kertész. Nothing was previously known about the life-history of any Tachiniscid, but Miss Vinall's specimen strongly suggested that they were parasitic in the larval state.

A remarkable structure, which Miss Vinall thought was perhaps the empty puparium of the fly, was taken from a "tin [in the cupboard] marked 'Mmembe'—very small edible caterpillars which are black with fawn underneath and started to pupate on 21.vii.1930. They feed on Iyembe tree." The imagines unfortunately had not emerged and the species was therefore at present unknown.

Miss Vinall had written, 25 Oct. 1930, since her return to England:—"I will certainly try to breed out some more Mmembe caterpillars on my return to the field to see the result. I had two or three other pupa-cases similar to the one I sent home, but I threw them away thinking they were dead. All this makes me long to get back to start observations again." Also, a few days later—"The other pupa-cases in the Mmembe tin had no apertures in them like the one I sent, but were marked by a little indentation and seemed to be empty."

He had shown the case or cocoon to his friends Major Austen, Dr. Imms, and Dr. Hugh Scott. Major Austen had never seen a Dipterous puparium which resembled it and was convinced that it was not Dipterous. Dr. Imms was of the same opinion. Dr. Hugh Scott had written as follows:—

"28 Oct. 1930.—We have come to no conclusion about the cocoon—I have shown it to several other people since you were here. Benson and I do not know anything hymenopterous like it,—though of course there may be something. Tams does not say positively that it is not lepidopterous, he only says he knows no lepidopterous cocoon like that. Marshall thinks, possibly a Limacodid. If the *Tachinoestrus* has any connexion with it, where is the puparium of the fly? There is no trace of it



inside the cocoon. Of course, the full-fed fly-maggot may have emerged from the cocoon of its host, and pupated outside, and Miss Vinall may have failed to find the empty puparium. The whole thing is a puzzle of an interesting kind and I don't like being beaten by it."

"30 Oct. 1930.—The cocoon under a high power (highest power of Zeiss binocular, or  $\frac{2}{3}$  inch objective of ordinary monocular, which is still higher) shows a framework of rather coarse threads, every interstice being filled in with a shiny brown chitinous substance—the interstices are rather large, and every thread is, as it were, *glued down* by the brown secretion. A Pompilid cocoon, which I happened to have near me for comparison, shows vastly more numerous silken threads, but they are much finer, and all interwoven, leaving no wide interstices; they are not glued down, but those on the surface, at any rate, are free, like the pile on a rough tweed cloth."

The nature and history of this cocoon and the history of the Tachiniscid fly were problems of the highest interest which it was hoped Miss Vinall would be able to solve on her return to the Belgian Congo.

THE WIDE-SPREAD HIVE-MOTH *GALLERIA MELLONELLA*, L. (PYRALIDAE) DESTROYING A HIVE AT NAIROBI: THEIR LARVAE AND PUPAE UNTOUCHED BY DRIVER ANTS (*DORYLUS*).—Prof. POULTON exhibited a series of 19 *G. mellonella*, a piece of comb containing their cocoons, and two blown larvae, sent to him by his friend Dr. V. G. L. van Someren, and described in the following letter:—

"3 Sept. 1930. Nairobi, Kenya Colony.

"I am sending you some curious moths which I have recently taken from a bee-hive. This hive was constructed in a dividing wall between two rooms of my house and had been in existence for about six months. As the bees did not worry us, I left it alone, but two weeks ago we had a swarm of *Dorylus*, which entered the hive and caused a great commotion amongst the bees, eventually driving them (the bees) out. The following day I took down the boarding on one side (after the ants had left) and was astonished to find that there was no comb containing honey, but beyond a small portion of newly constructed cells, all the comb was either eaten away to a considerable extent or was occupied by the larvae and pupae of the moths I send. There were in all about three square yards of comb, so one can judge the size of the swarm which had made the structure in six months. Two months ago there was a decided diminution in the number of bees using the hive, but beyond noting the fact I thought nothing of it. The presence of the moth in the hive was undoubtedly the cause, for judging by the thousands of moth larvae and pupae in the comb, there could have been little chance for the bees to rear their own young. Presumably, the bees did not attack the moths or their larvae, for I could find no dead larvae or pupae, and apparently the *Dorylus* had not touched them either. I examined the food which the ants were removing, and it consisted of nothing but bits of the comb with hardened honey attached. I placed some of the comb in breeding-cases, and a section of comb about a foot square infested with the moth larvae was eaten and reduced to nothing in less than a week, and when the larvae were ready to pupate they made use of a partially eaten piece of comb and spun their cocoons in parallel series as in the portion sent. I have never taken this particular moth

before so far as I can recollect, and I shall be very interested to hear what you think of it."

Mr. W. H. T. Tams, who had compared the fine series of moths with the material in the British Museum, considered that they were specifically identical and that there was no evidence of the existence of a local race. It was extremely interesting that the larvae and pupae were protected against *Dorylus*.

THE RARE SYRPHID FLY *POCOTA APIFORMIS*, SCHR., AT OXFORD.—Prof. POULTON said that on 24 October 1930, he had taken a dead female of this species from the interior of the opal glass shade covering an electric light bulb in the hall of his house, 56 Banbury Road, Oxford. The specimen, exhibited to the meeting, showed a wonderfully exact mimetic resemblance to such British Humble-bees as *Bombus latreillellus*, Kirb., *pratorum*, L., *terrestris*, L., and *lucorum*, L. (*hortorum*, L.), especially the two last-named. The insect taken in these peculiar circumstances was apparently the first record for the Oxford district, but there could now be little doubt that Mr. Hamm was right in his belief that a fly he had seen settled on a leaf in the Oxford University Parks in June 1930 was this species. Two males from the Dale Collection were also exhibited; also a male with its puparium bred by Mr. Donisthorpe from a larva taken from a damp cavity in the middle of a large ash in Windsor Forest, and kindly presented to the Hope Collection (1928 (1929), *Proc. Ent. Soc. Lond.*, 3:36). One of the Dale specimens was evidently the first British record of the species. Mr. G. H. Verrall, in 1871, *Ent. Mon. Mag.*, 7:203, had mentioned the insect figured by Moses Harris as the first record, but also referred to a Dale specimen. Later (in 1901, *British Flies*, 8:588), he came to the conclusion that the Harris figure agreed more closely with *Arctophila bombiformis*. It was difficult to decide as to which of the Dale specimens was referred to by Verrall in 1871. One of them bore the label "Bristol," the other only the number "13." We were not helped to decide by Verrall's words—"I have notes that Mr. Dale's specimen had the end of the abdomen yellowish and the extreme margin of the mouth reddish"—for Mr. J. E. Collin found that this description applied equally to both specimens. However, as he remembered Mr. Verrall speaking of Bristol in connection with the Dale *Pocota*, it might be assumed that the specimen bearing this locality was the first British record. [Mr. B. M. Hobby has kindly called my attention to the record, in 1919, *Entomologist*, 52:261, of the capture of this Dipter on a window at Wellington College, in June 1918, by Mr. W. J. Arkell.—E. B. P., 14 Jan. 1931.]

DISTINCT BEAK-MARKS ON *HEODES PHLAEAS*, L.—Prof. POULTON exhibited the two specimens taken by his friends Dr. R. C. L. Perkins and Mr. Hamm. Dr. Perkins wrote:—

"31 Oct. 1930.—I herewith enclose a beak-marked *C. phlaeas* from Gloucestershire, in case it may be of any interest to you. In Aug. this year I captured for my son a series of 2 or 3 dozen from a beautiful little clearing in a wood near Wotton-under-Edge, so that he would have material for comparison with the Irish specimens he was collecting at the same date. I naturally neglected the worn and torn specimens, and all that I caught except this one were practically perfect and fresh, but

worn and torn individuals were of course present. The clearing was a flower garden of tall hemp agrimony and *Epilobium angustifolium* with some thistles and ragwort. I spent many hours there as it abounded in butterflies, *G. c-album*, *V. io* and *atalanta*, *A. paphia*, *L. egerides* and *megaera*, together with *phlaeas*, *icarus* (very numerous) and a sprinkling of other species.

"I did not notice the beak-mark on this *phlaeas* at the time, as the butterflies were left unpinned, but relaxed, until I left Gloucestershire, or else I should have caught some of the torn specimens.

"In the very thick bushes and trees round one side of this clearing there was a large company of some small bird; the noise they kept up was unfamiliar to me and I thought was probably that of some warbler, but my brother who was with me on one occasion and to whom I remarked that I had never been able to get a sight of the birds, thought it might be some tit. It certainly was not one of our commonest species of tit or warbler, but I was so occupied otherwise that I did not even to the end of my visit get a sight of the birds, though I collected in the clearing, sometimes for hours together, on at least a dozen occasions. I saw no bird in the open, though this company was always present in the thick bushes, but extraordinarily shy. You will notice the front wing has a beak-mark also at the tornus, but whether this was done at the same attack as the perfect impression on the hind-wing I don't know. The impression of the edges of the beak on the underside is easily seen in certain aspects, though the scales have not been removed to the same extent as on the upper."

The beautifully clear beak-mark extended from the outer margin of L.H.W., the tip nearly reaching the base. The butterfly had evidently been seized when its wings were expanded, either in flight or more probably when settled. The mark on the L.F.W. appeared to have been made at the same time as the other and at a moment when there was sufficient overlap to have caused the coincidence.

The *H. phlaeas*, taken, 23 June 1923, by Mr. A. H. Hamm at Hogley Bog, Bullingdon, Oxford, had been seized at the apical angle of R.F.W., the tip of the beak-mark very nearly reaching the inner margin. The whole of the wing around the posterior angle, beside the tip of the beak-mark, had broken away, leaving a large gap. A specimen of *phlaeas* taken by Mr. Hamm in the same locality, 4 Jan. 1922, exhibited an injury which affected all four wings. (1922, *Proc. Ent. Soc. Lond.*, 1922: li.)

THE EPIGAMIC BEHAVIOUR OF *AGLAIS URTICAE*, L., &c.—Prof. POULTON said that ever since 11 May 1900 when he witnessed the courtship of *urticae* (1904, *Proc. Ent. Soc. Lond.*, 1904: xlii) he had been on the lookout for further observations on this interesting subject. During the past summer his friend Sir Richard Threlfall, F.R.S., had described the behaviour of a pair of *urticae* observed by him between 1.30 and 3.0 p.m., 10 May 1930, at Burton Court, on the left bank of a small branch of the river Arrow, about a mile below Eardisland village and four miles from Leominster. Here, in bright sun with some wind, he watched a pair of Small Tortoiseshells settling on the long grass and when disturbed flying together for a few yards, and settling again in the same positions as before, one behind the other with its head



about  $\frac{1}{2}$  inch from the hind end of the forward slightly larger insect, which he took to be the female. They were disturbed and settled again in this manner, three or four times. After about  $\frac{3}{4}$  hour he became tired of watching and left them at the same occupation. When the drumming of the male's antennae upon the hind-wings of the female was described to him, Sir Richard immediately recognised that the distance between the head of the male and the stern of the female was just about such a distance as would lend itself to this drumming. All the details observed by Sir Richard Threlfall and also by his chauffeur were consistent with the 1900 record, and it was only because a near approach with strong glasses disturbed the butterflies that further details could not be seen.

Mr. J. A. Simes had kindly informed him of two other interesting records which he had overlooked. The first was Dr. T. A. Chapman's notes on "*The Pairing of *Aglais urticae**" (1911, *Ent. Rec.*, 23 : 208-210). These observations were made by the author and Mr. Lionel Adams, on 7 May 1911, at 2.30 p.m., in a grassy lane, where there was a large patch of nettles—no locality was mentioned—and were continued for over half-an-hour, "of which some 12-15 minutes at least were occupied by the approach of the male after the female had finally settled down." The behaviour was interrupted when the sun became obscured. The tapping by the male's antennae was not observed, although nodding movements of his head were seen. At the end of the observation the female, followed by the male, dived into the dense undergrowth beneath a nettle-bed and probably paired, although this was not actually seen, in all probability because the violent efforts to trace the insects in the rank growth disturbed them and caused them to separate.

Mr. Simes' observations were made on 18 July 1912 "about 3.30 p.m. on a sunny bank by the side of a mountain path about 500 feet above Abriès," S.E. France (1914, *Ent. Rec.*, 26 : 250, 251). He thought it likely that the pursuing insect, which appeared to be the larger and paler of the two, was the female, but many observations on the epigamic behaviour of this and other butterflies supported the conclusion that it was a male.

"This larger and paler insect took up a position in regard to its partner similar to that assigned to the male in Dr. Chapman's pair; but its antennae, diverging at an angle of  $45^\circ$ , fell over the outspread hind-wings of the butterfly in front, and by a series of nervous spasms, continuing as if by clockwork, struck the hind-wings perfectly audible blows with great regularity. I counted these blows by my watch for several minutes and found them to average about seventeen to the minute. We watched this pair for 25 minutes, during which period it rose in the air three times and took up a fresh basking position; finally, however, it disappeared over a hedge and I was unable to follow it" (*ibid.*, p. 251).

It was especially interesting to know that the audible blows of the male's antennae upon the hind-wings of the female had been heard by a third observer, the two previous records (in our 1904 *Proceedings*) having been by Mr. A. J. Chitty and himself.

Another interesting point was the conclusion that the epigamic behaviour was similar in the hibernated and later generations; for Mr. Simes' pair observed in July evidently belonged to the latter and all the other records, including Mr. Chitty's (Easter), to the former.

Mr. O. W. Richards called attention to the records of the epigamic behaviour, sometimes involving the use of the antennae, of *Pararge megaera*, *Leptidia sinapis* and *Epinephele jurtina*.

The observations to which Mr. Richards directed our attention are so interesting and so clearly related to those upon *Aglais urticae* that I venture to append a brief account of them.

(1) The late Mr. H. Rowland Brown (1918, *Entomologist*, **51** : 233) noted that, in Aug. 1918, when *Pararge megaera* was swarming on the Corfe and Swanage Downs, a female settled low down on a bare patch of warm earth and vibrated her wings continuously and rapidly until a male appeared. He, "after a preliminary flutter, settled down in front of the female, and commenced butting at her with his antennae, she answering back—for all the world like a pair of rams fighting. After some minutes this odd courtship was interrupted by another male; whereupon the original wooer engaged his adversary, and in precisely the same manner as he had engaged the female," which meanwhile had flown away. The same method of courtship was also observed on another occasion.

(2) A. M. Cochrane (1909, *Ent. Rec.*, **21** : 201), near the Walensee, 30 July 1909, observed a ♀ *Leptidia sinapis* ovipositing. A ♂ passing by "flew down close to her, and apparently forced her to settle on a clover leaf. . . ." Here she remained quiescent while the ♂ settled, facing her, about  $\frac{1}{2}$  in. between them, and moved his head rapidly from side to side, just failing to strike the costae of her F.Ws. with his antennae; his extended spiral maxillae however did so, being "drawn quickly up the edge of the wing-costa, and as quickly moved back again for the operation to be again and again repeated, sometimes 20 or 30 movements were made before the ♂ took a rest, at other times . . . half-a-dozen," the ♂ meanwhile advancing until his face nearly touched the female's and the appearance was that of the ♂ washing the female's face, but at this stage the closeness of the insects caused his tongue or antennae to touch the antennae of the female instead of her F.W. costae. At this she started and three or four times flicked her wings and advanced as if to drive back the ♂. The same behaviour was then begun over again, about 17 movements of the male's head being counted in 5 seconds. The male gradually advanced as before and was again driven back. There was no attempt at pairing but the ♀ must have been pleased with the attentions paid to her, for she could have flown off at any moment. The performance continued for 47 minutes when it was interrupted by a *Pieris rapae*, causing the ♂ to fly off while the ♀ apparently resumed her egg-laying. Both ♂ and ♀ were somewhat worn. About half-an-hour later another ♂ and ♀ were seen acting in a similar manner until they too were subjected to the same disturbance.

(3) G. H. Locket (1927, *Ann. Mag. Nat. Hist.*, (9) **20** : 92 n.) observed that the male of *E. jurtina* "has a curious habit of bumping up against the female when they are together on a leaf, either from in front, when the anterior margin of their wings come into contact, or from behind. The act, as in spiders, probably has a stimulating effect." (E. B. P., 12 Dec. 1930.)

BEES AND AN EMPID FLY TAKEN VISITING ORCHIDS IN FRANCE.—Prof. POULTON exhibited the following specimens captured by Col. G. H. Evans, C.I.E., C.B.E., and communicated the accompanying interesting notes.

BEES TAKEN AT VALESCURE, NEAR ST. RAPHAËL (VAR), IN THE FLOWERS OF  
*SERAPIAS CORDIGERA*, ON 29TH APRIL, 1930.

\*No. 1. *Osmia fulviventris*, Panz., ♂: Pollinia.

No. 2.     ,,         ,,         ,,         ♂:     ,,

ON 7TH MAY 1930.

No. 4. *Eucera punctilabris*, Lep., ♂: Pollinia.

No. 5. *Osmia aenea*, L., ♀: Pollinia.

No. 6.     ,,         ♀:     ,,         (many).

No. 7. *Osmia fulviventris*, Panz., ♂: Nil.

No. 8. *Eucera collaris*, Dours, ♂: Pollinia.

In addition, twelve specimens of No. 8 were taken, none with pollinia.

ON *OPHRYS ARACHNITIFORMIS*, 30TH APRIL, 1930.

No. 3. *Andrena nigroaenea*, Kirby, ♂: Pollinia.

For the identification of the bees I am deeply indebted to Monsieur L. Berland Muséum d'Histoire Naturelle, Paris.

I. With one exception, viz. *Andrena nigroaenea* taken on *Ophrys arachniti-formis*, the bees were found in the flowers of *Serapias cordigera*.

II. The bees enter the flowers of *S. cordigera* and frequently remain within them for long periods. Evidence of their presence is generally indicated by the fact that usually the body of the bee is not entirely covered by the side lobes of the labellum. The end of the abdomen is thus visible, but not easily seen unless the flower is tilted upwards.

III. When a bee is observed within a flower, the flower together with contained bee is removed and placed in a glass-topped box. On arrival home boxes are placed glass top downwards on a table. It was noted that during the day when weather was bright, if the boxes were turned over, the bees usually emerged at varying short intervals. If the boxes were again turned glass top downwards and inspected after an interval of half-an-hour or less, it was found that the bees had retired into their flowers.

IV. Until this season *Eucera* has not been found by me in the flowers of this orchid. A number were taken, only two carrying pollinia, i.e. *Eucera collaris*.

On examination of flowers which had been occupied by bees not carrying pollinia, it was found that the pollinia had been extracted.

One fine specimen of this orchid was found on which six of the flowers were occupied by bees, all without pollinia. These bees were *Eucera collaris*.

[The following extract is copied from a letter written by Col. Evans on 17 August 1930.]

"There is little doubt about the validity of Col. Godfery's theory that the flowers of *Serapias cordigera* offer attractive lodgings, at any rate for certain bees [1928, *Proc. Ent. Soc. Lond.*, 3: 60; *ibid.*, 1929, 4: 105]. Finding half-a-dozen *Eucera* all asleep in the flowers of a single spike convinced me of the correctness of his views."

\* This specimen and Nos. 5, 7, and 11 in the following lists, were not received.—E. B. P.



## BEES AND AN EMPID CAPTURED IN 1930, AT ANNECY, H. SAVOIE.

A. Visiting *Listeria ovata*.No. 11. *Eucera longicornis*, L., ♂ : May 31.No. 12. *Empis tessellata*, F., ♂ : June 2.B. Visiting *Cephalanthera rubra*.No. 13. *Heriades nigricornis*, Nyl., ♂ : June 21.No. 14. *Heriades campanularum*, Kirb., ♂ : June 23.

No. 15.       "       "       "       2 ♂ 1 ♀ : June 21.

No. 16. *Eucera longicornis*, L., ♂ : June 19.

No. 17.       "       "       ♂ : June 23.

Prof. POULTON said that he was greatly indebted to Col. Evans for this most interesting series which would become an important part of a special collection illustrating the fertilisation and crossing of flowers by insect visitors.

RELATION BETWEEN MEAL-WORMS AND ATMOSPHERIC HUMIDITY.—Dr. P. A. BUXTON gave a short account of some recent work (1930, *Proc. Roy. Soc.*, (B) 106 : 560–577). He said that unfed meal-worms (*Tenebrio molitor*) could live for at least a month at 30° C. (86° F.) in dry air. Even at that temperature they were motionless after the first day or two, and at room temperature they could live at least seven months under the same conditions. It followed that their metabolism was very slight, and that their loss of water might be approximately measured by their loss of weight. Curves were shown for loss of weight at various temperatures and humidities, from which it appeared that the relation between loss of weight and humidity was complex. Among other things, it seemed that there was a limit to the amount of water which can be lost per day, and it is possible that loss is controlled largely by closing the spiracles. During a month's exposure in dry or fairly dry air, the meal-worm maintained the proportion between water and solids in its body very nearly constant, though the weight fell to 70% of what it was at the beginning of the experiment. This maintenance of a definite proportion of water was accomplished by consuming some solid (perhaps fat), and making use of the water of oxidation. When meal-worms were kept in a moist atmosphere (90% relative humidity), individuals behaved very differently from one another, but the tendency was for weight to rise. In these circumstances, the proportion of water in the insect's body rose, and a condition of water poisoning resulted.

The relation between these facts and the problems of insect life in stored products, and in deserts, was briefly discussed and illustrated with lantern slides.

SOME OBSERVATIONS ON THE HATCHING OF INSECTS FROM THE EGG.—Dr. V. B. WIGGLESWORTH showed a series of lantern slides to illustrate the mechanism of hatching in various insect eggs as observed by Miss E. K. Sikes and himself. Six insects were studied.

(i) In the flea (*Ceratophyllus wickhami*) from the grey squirrel, the larva in the egg swallows the amniotic fluid until it comes to fill the shell completely and all the fluid has been consumed. Then it creeps round inside the egg until the "hatching spine,"

which lies on the top of its head, pierces the shell and cuts in it a longitudinal slit through which the larva escapes.

(ii) In the meal-worm (*Tenebrio molitor*), the larva swallows the amniotic fluid, and then breaks open the shell by forcibly extending its body.

(iii) In the grain moth (*Sitotroga cerealis*), as in other Lepidoptera, the larva devours the yolk which lines the shell and then bites its way out.

(iv) The blow-fly (*Lucilia sericata*) strikes the end of the eggshell with the fore part of its body until it has caused a Y-shaped flap or cap to spring open. The vitelline membrane then bulges out and this is ruptured by the mouth hooks of the larva.

(v) The bed-bug (*Cimex lectularius*) swallows the amniotic fluid, and then by contractions of the hind part of the body drives the body fluids into the head region. This displaces the cap of the egg and by continued peristaltic movements the larva works its way out. It is still enclosed in its "pre-larval cuticle," but by actively swallowing air it distends its body until this cuticle has ruptured and is shed. The pre-larval cuticle bears a series of small backwardly directed spines which probably aid the hatching process.

(vi) In the sucking-louse (*Polyplax serrata*) from the mouse, the general mechanism of hatching is like that in *Cimex*, but the insect swallows considerable amounts of air while it is still inside the egg, and the pre-larval cuticle splits as soon as the head of the larva is protruded. *Polyplax* and the other genera of Anoplura examined (*Pediculus*, *Pedicinus*, *Phthirus*, and *Haematopinus*) all possess complicated hatching spines situated on the pre-larval skin and shed at the time of hatching.

A detailed account of this work, together with some observations on the first appearance of air in the tracheal system, is in the press and will be published in the *Quart. J. Micr. Sci.*, 74: 165-192.

#### PAPERS.

The following papers were read:—

1. Dr. K. R. KARANDIKAR. "The Early Stages of *Trichocera maculipennis* (Meig.)."
2. Mr. A. PICKLES, B.Sc. "On the Metamorphoses of the Alimentary Canal in certain Ephemeroptera."
3. Messrs. C. T. GREENE and F. W. URICH. "The immature stages of *Pantophthalmus tabaninus*, Thunberg, with biological notes."
4. Mr. W. J. HALL. "Observations on the COCCIDAE of Southern Rhodesia, IV."
5. Dr. E. A. COCKAYNE. "Three rare Abnormalities in Lepidopterous Larvae—Homoeosis, Somatic Mutation, Spiral Segmentation."
6. Mr. A. M. LEA. "On some MORDELLIDAE from New Guinea and Fiji."
7. Capt. A. F. HEMMING, C.B.E. "A Revision of the Genus *Iolana*, Bethune-Baker (Lepidoptera, LYCAENIDAE)."
8. Mr. B. P. UVAROV. "Insects and Climate."

Wednesday, November 19th, 1930.

Dr. K. JORDAN, President, in the Chair.

*Nominations.*

The SECRETARY read the following list of Fellows nominated by the Council for the ensuing year :—

*For President :* H. ELTRINGHAM, M.A., D.Sc., F.R.S.

*For Treasurer :* Capt. A. F. HEMMING, C.B.E.

*For Secretary :* S. A. NEAVE, M.A., D.Sc.

For other members of Council :—H. W. ANDREWS, Capt. E. BAGWELL-PUREFOY, F.Z.S., E. C. BEDWELL, K. G. BLAIR, B.Sc., G. H. CARPENTER, D.Sc., M.R.I.A., H. St. J. K. DONISTHORPE, F.Z.S., F. W. EDWARDS, M.A., Major R. W. G. HINGSTON, M.C., A. D. IMMS, M.A., D.Sc., F.R.S., K. JORDAN, Ph.D., F. MUIR, W. RAIT-SMITH, O. W. RICHARDS, M.A., H. WILLOUGHBY ELLIS, F.Z.S.

*Election of Fellows.*

The following were elected Fellows of the Society :—V. G. DESHPANDE, M.Ag., Department of Agricultural Zoology, 10, George Square, Edinburgh; U. S. SHARGA, M.Sc., Department of Agricultural Zoology, 10, George Square, Edinburgh; JOHN SMART, B.Sc., 4, Chalmers Crescent, Edinburgh.

*Exhibits.*

THE OVIPOSITION OF *EPINEPHELE JURTINA*, L. (*JANIRA*, L.).—Mr. J. A. SIMES said that in September 1929 he had observed this butterfly ovipositing on Bembridge Down near Yaverland. The turf was very short but “springy” from the accumulation, below the green top, of the dead grass-stems of many years past. The females of *jurtina* almost burrowed into this dead material and seemed impelled to deposit their eggs as low down as possible. In no case did they lay on the green grass-blades, but always on the dead stems below. It appeared probable that the instinct is an adaptation tending to preserve the eggs from destruction by herbivorous animals. Furthermore, the larvae, which feed only at night, retired into the dead stems by day and thus, apparently, also secured a considerable measure of immunity from injury.

Prof. POULTON said that this interesting adaptation was probably extremely ancient and would be found in many grass-feeding insects. The predominance of the grasses, starting in the Secondary Period and followed by an almost world-wide distribution in the Tertiary, led to conditions favouring the rapid evolution of numerous and varied mammalian types and the appearance of a rigid selective test permitting the survival of only those relatively minute grass-feeding species which could meet the danger by the development of special adaptations.

Mr. L. W. NEWMAN said that he had repeatedly noticed that females of *jurtina* invariably deposited their eggs on the black mosquito netting which covered the cage in preference to the grass which had been introduced for their use.



Mr. H. MAIN said that the eggs of *Melanargia galatea*, L., were not attached to the grasses on which the larvae fed, but were scattered loosely by the butterfly and so would fall down among the bases of the stems, where they would be protected from browsing animals as in the instance referred to by Mr. Simes. He had found that the eggs were readily deposited by females confined in boxes. They were quite free, while those of some allied continental species were attached to the sides of the box.

A REMARKABLE OVAL FENESTRATION IN BOTH FORE-WINGS OF THE PIERINE BUTTERFLY *CATOPSILIA FLORELLA*, F., FROM NYASALAND.—Prof. POULTON exhibited this example of a most unusual injury which had been kindly brought to him from the captor, Mr. Rodney C. Wood, by Major R. W. G. Hingston. Mr. Wood had written: "I am sending a *Catopsilia florella* female with two similar and symmetrical fenestrations in the fore-wings." The label recorded the date, 20 Jan. 1929, and the elevation, 2700 ft., the locality being evidently the Magombwa Estate, P.O. Cholo, Nyasaland, a locality described in 1929, *Proc. Ent. Soc. Lond.*, 4: 40. The perforations, which were not quite identical, occupied nearly the whole width of area 6, extending from the discocellular to about midway between this vein and the outer margin. Parts of the rim of each were marked by a very fine dark green line—probably caused by coagulated blood (haemolymph), and suggesting the cause of the injury. There seemed to be no escape from the conclusion that the butterfly was wounded soon after its emergence from the pupa-case, when its soft, imperfectly expanded wings were hanging down one against the other. In this position the impact of a thorn or sharp beak or the piercing mouth-parts of a predaceous insect would be likely to wound both wings in the same spot. The aperture thus made would probably be roundish, becoming subsequently drawn out into an oval because the expansion of the wing in length is so much greater than in breadth. The slight exudation at the edges of the torn surface would follow naturally from the blood-pressure, which played an essential part in the process of expansion. Of the possible causes the most probable appeared to be the last-named, *i.e.* the piercing rostrum of such an insect as a Reduviid bug. Similar injuries drawn out into an oval between the veins of one wing had been previously described but, so far as he was aware, never before in the same spot of both right and left wing.

THE FORMATION OF THE PERITROPHIC MEMBRANE IN THE TSETSE-FLY (*GLOSSINA*).—Dr. WIGGLESWORTH said that the peritrophic membrane is a delicate chitinous tube which encloses the food within the mid-gut of many insects. In the tsetse-fly it is secreted in the form of a fluid by a ring of large epithelial cells at the base of the proventriculus. This fluid is drawn through the narrow cleft between the wall of the proventriculus and the invaginated fore-gut; and in this way it is pressed and condensed to yield a uniform membranous tube, comparable to the "inner tube" of a pneumatic tyre. Many parts of the mid-gut are narrower than this annular press in which the peritrophic membrane is moulded. Consequently the membrane, as seen in cross section, is thrown into the most complicated folds.

A full account of these observations has been published in 1929, *Parasitology*, 21: 288–321.

Mr. HIGGINS exhibited a number of butterflies from Piedmont, including several subspecies recently described by him in the *Entomologist*, with other European forms for comparison.

Attention was particularly directed to the large *Melitaea varia piana*, mostly taken at a level of about 4000 ft. A preparation of the very characteristic male genitalia was shown to demonstrate beyond doubt the specific identity of the specimens with *varia* from the High Alps. The exhibitor suggested that the form was probably widely distributed in the Maritime Alps, but had hitherto been overlooked on account of its superficial similarity to *athalia*, Rott., and to *parthenoides*, Keferst. It had been customary to regard *varia* as essentially a high Alpine species, but it was necessary to change this view as the ssp. *piana* was taken at a comparatively low elevation, one specimen indeed at only 2500 ft.

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### Wednesday, December 3rd, 1930.

Dr. K. JORDAN, President, in the Chair.

#### *Nominations.*

The SECRETARY read for the second time the list of Fellows nominated by the Council as Officers and Council for the ensuing year.

#### *Election of Fellow.*

The following was elected a Fellow of the Society:—HERBERT CALDWELL JAMES, Ph.D., The Zoological Laboratory, The Museums, Cambridge.

#### *Exhibits.*

SPIDERS AND THEIR INSECT PREY.—Mr. B. M. HOBBY said that most of the exhibited spiders belonged to the family THOMISIDAE. Some species of this group sat in flower-heads, the petals of which they closely resembled in colour. In these species the ability to change colour was developed in a high degree, so that the spider was not confined to flowers of one colour, but could itself alter to resemble its surroundings (*vide* Gabritschewsky, 1927, "The color changes in the Crab-spider," *J. Exp. Zool.*, **46**: 251-267). The specimens, except No. 15, came from the Palaearctic and Ethiopian Regions. It was of interest to note the same kind of bionomic association in the two areas. Among the prey were many insects considerably larger and evidently more powerful than the captors. This would indicate that the spider injected a quick-acting poison, though it did not always act instantaneously as several observers record the prey as being alive. There was a large proportion of butterflies among the prey. This might probably be due to the ease with which an observer would notice a captured butterfly as compared with a fly. In the case of the Thomisid spiders the prey consisted of twelve males, six females and two of undetermined sex—all common flower-frequenting species. They included ten with contrasting colour-patterns, of which six (*Sphecodes*, *Ammophila*, *Halictus*, *Neptis* and the two species of *Acraea*) were well known to be protected. The remainder possessed markings of a more or less procryptic nature, but only in three (*Grypidius*, *Temnora* and *Satyrus*) were these highly developed.

Unless otherwise stated the spiders named below were Thomisids.

1. *Xysticus kockii* with Pierine butterfly *Pieris napi*, L., ♂: Hogley Bog, Oxford; 18 May, 1918.—A. H. Hamm. The spider held its prey by the abdomen. The fore-wings were stained brown. Mr. Hamm suggested that the spider attacked the thorax first and injected a poisonous fluid which has spread laterally over the wings.

2. *Misumena vatia*, Walk., with Nymphaline butterfly *Brenthis selene*, Schiff., ♂: Pamber Forest, near Basingstoke, Hants; 11 June, 1921.—E. B. Poulton. The spider was olive green and white in colour and seated upon flowers of ragged robin.

3. *Philodromus aureolus*, Clerck, with Satyrine butterfly *Coenonympha pamphilus*, L., ♂: New Forest, 16 June, 1922.—W. J. Lucas. The spider was bright yellow in colour (*vide* 1929, *Proc. Ent. Soc. Lond.*, 4: 20).

4. *Xysticus cristatus*, Clerck, with Lycaenid butterfly, *Lycaena icarus*, Rott., ♂: Hogley Bog, Oxford; September, 1921.—A. R. Jackson. On a thistle.

5. Spider, family indet., with Lycaenid butterfly, *Lycaena icarus*, Rott., ♀: Hogley Bog, Oxford; 5 September, 1926.—A. H. Hamm. Mr. Hamm stated that the butterfly was still alive when found.

6. Thomisid with weevil *Grypidius equiseti*, F.: Luccombe Chine, I.O.W., 25 April, 1909.—H. Donisthorpe.

7. *Xysticus kockii* with Limnobiid crane-fly *Pedicia rivosa*, Glyn., ♂: Hogley Bog, Oxford; 11 May, 1918.—A. H. Hamm. The spider held prey by the tip of the abdomen.

8. *Misumena vatia* with fly *Syrphus ribesii*, L., ♂: R. H. S. Gardens, Wisley.—Capt. W. R. Apps. MS. note: "On a rose petal."

9. A white Theridiid spider *Pyllonethis lineatus* with Tachinid *Lucilia caesar*, L., ♀: Bagley Wood, Berks; 10 June, 1905.—A. H. Hamm. The prey was spun up in a light web beneath a head of yarrow flowers.

10. Thomisid with bee *Apis mellifera*, L., ♀: New Forest; 25 May, 1926.—W. J. Lucas. The specimens were beaten from hawthorn, and the spider still clung to its prey.

11. *Misumena vatia* with prey (probably a bee, but lost). The spider was olive-greenish white in colour and seated on a white umbelliferous flower. Pamber Forest, Hants, 11 June, 1921.—J. de C. Laffan.

12. *Philodromus aureolus*, Clerck, with Sphecid wasp *Ammophila campestris*, Latr., ♂: Ramsdown, Hurn, Hants; 4 July, 1928.—W. J. Lucas. The spider was bright pink in colour and seated on heather flowers (*vide* 1929, *Proc. Ent. Soc. Lond.*, 4: 20).

13. *Misumena* sp. (or genus near it) with Satyrine butterfly *Melanargia lachesis*, Hubn., ♀: La Granja, Sierra de Guadarrama, Spain, about 4000 ft.; 24 July, 1902.—E. B. Poulton. On flowers of scabious. MS. note: "spider belongs to yellow flowers, but had gone to lavender [-coloured ones]."

14. Thomisid with Satyrine butterfly *Satyrus semele*, L., ♂: La Ste. Baume; 5 July, 1924; observer's name not recorded on labels. MS. note: "Crab spider lying in wait in lavender seized *semele* on dorsal surface of thorax behind head and killed it."

15. A white Thomisid with Nymphaline butterfly *Neptis eurynome*, Westw.,



♂: Macao, China; 4 October, 1904.—J. C. Kershaw. The spider seized the butterfly by the head.

16. Spider, family indet., with Nymphaline butterfly *Hypolimnas misippus*, L., ♂: Mombasa, Kenya Colony; 28 May, 1906.—K. St. A. Rogers.

17. *Thomisus* sp. with Acraeina butterfly *Acraea bonasia*, F., ♂: Old Calabar, S. Nigeria, 150 feet; 8 January, 1902.—C. J. M. Gordon. The butterfly was on a flower, the spider holding it by the thorax. The butterfly was not quite dead, as it could move its wings and antennae a little.

18. Thomisid with Acraeina butterfly *Acraea orina*, Hew., ♀: Oni camp near Lagos; 5 July, 1910.—W. A. Lamborn. On a flower.

19. Thomisid with Lycaenid butterfly *Pseuderesia zeritis*, Plotz., ♀: Oni clearing, Lagos; 2 February, 1912.—W. A. Lamborn. MS. note: "In grasp of spider on a green twig near clearing 2.2.12 at 4 p.m. I saw the butterfly feeding on this twig 9 a.m. 2.2.12."

20. Spider, family indet., with moth on top of leaf. Oni, near Lagos; 31 January, 1912. W. A. Lamborn. The moth is a female, but is so badly damaged that identification is impossible.

21. Thomisid with Sphingid moth *Temnora hollandi*, Clark, ♂: Oni, near Lagos; 9 a.m., 14 June, 1912.—W. A. Lamborn. MS. note: "In grasp of yellow spider on a leaf of a plant having small blue flowers."

22. Spider, family indet., with Catocaline moth *Mocis frugalis*, Fab., ♂: Old Calabar, S. Nigeria, 150 feet, 11 January, 1902.—C. J. M. Gordon. MS. note: "As I was trying to capture this moth it passed near the spider which at once pounced upon it. . . . The moth's wings were torn by the spider."

23. *Thomisus albus*, Gmel., with Syrphid fly *Syrphus ribesii*, L., ♀: Sierra de Guadarrama, La Granja, Spain, about 6000 ft.; 25 July, 1902.—E. B. Poulton. On thistle head.

24. "Rock" spider with male Syrphid fly. Hammam Righa, near Blidah, Algeria; 24 Mar. 1905.—G. B. Longstaff.

25. *Thomisus* sp., or an allied genus probably *Pistius*, with Andrenid bee *Halictus scabiosae*, Rossi., ♀: Port Bou, E. Pyrenees, N.E. Spain; 24 June, 1901.—E. B. Poulton.

26. Probably *Pistius* sp., with Andrenid bee, *Sphecodes reticulatus*, Thoms., ♂: San Geronimo, Montserrat, Barcelona, about 4000 feet; 15 July, 1901.—W. Holland. MS. note: "On yellow umbel." (1904, *Trans. Ent. Soc. Lond.*, 1904: 644.)

27. Two Thomisid spiders without prey. Swept in a field of buttercups, Stanton St. John, Oxford; 12 June, 1921.—J. Collins. They were bright yellow in colour.

28. Spider, family indet., with Fossor *Mellinus arvensis*, L., ♀: Bitterne Park, Southampton; 5 September, 1930.—B. M. Hobby. The spider had spun a vertical web almost immediately in front of the entrance to a *Mellinus* burrow. The wasp was but lightly entangled in silk and had seized one of the posterior legs of the spider in its mandibles. The spider had retreated as far as it was permitted by the grip on its leg. Both were put in a pill-box, where the spider killed and ate the wasp.

29. At Longdown, New Forest; 4 September, 1930; a spider had spun a horizontal web among the branches of a low gorse bush. Hidden beneath the bush was a large number of burrows of *Mellinus arvensis*, L. Females repeatedly

arrived with prey. They would alight on the outer branches of the bush, and make their way by means of a series of short flights into the interior. A female thus laden was observed to blunder into the horizontal web. The spider approached quickly and the wasp dropped the prey and escaped. The prey remained suspended in the web. Later another female, with a Tachinid (*Bucentes geniculata*, De Geer, ♂), became entangled in the web. The wasp released its leg hold but retained its mandibular grip on the proboscis of the prey (*vide* photograph 1930, *Trans. Ent. Soc. Lond.*, 78: 97). The spider again approached and seized the *Bucentes* by the tip of the abdomen. A kind of tug-of-war took place between the two for some moments. Eventually the wasp was successful and escaped from the web with its prey.—B. M. Hobby.

30. Epeirid spider *Araneus quadratus*, Clerck, with Aretiid larva. Nursling, Hants.; 30 September, 1930.—B. M. Hobby. The spider's web was spun vertically among general herbage about a foot above ground-level. The larva was well wrapped in silk, and was being eaten by the spider. Lepidopterous larvae and pupae were most unusual prey for spiders. This species of spider was large and powerful, and frequently caught bees and wasps in its web.

The spiders have been identified by Dr. A. R. Jackson, R. I. Pocock, and F. P. Smith. Much help in the identification of the prey was given by J. E. Collin, A. H. Hamm, Prof. E. B. Poulton, and W. H. T. Tams.

EVIDENCE OF CONFLICT BETWEEN FEMALES OF THE FOSSORIAL WASP *MELLINUS ARVENSIS*, L., AT THE BURROW.—Mr. B. M. HOBBY said that with the help of Mr. G. C. Johnson, B.Sc., of the University College, Southampton, he had excavated numerous burrows of *Mellinus arvensis* at Bitterne Park, Southampton, on 5 September, 1930. A dead female was found in a perfectly relaxed condition some 8 inches down a burrow, which contained three flies in a single unsealed chamber at its end. Just outside another burrow a dead female was found in a hard and dry condition, with the head severed from the body but lying quite near. On another occasion a female was seen to approach a burrow just as a second female was about to emerge from it. The first wasp ran up to the burrow, seized the head of the other in its mandibles and dragged her from the burrow. The two insects then struggled for some moments. On being boxed they separated unhurt. The impression gained was that the rightful owner had returned to the burrow and had found an intruder in possession. The above observations suggested the inference that occasionally females may fight to the death for the possession of an excavated burrow.

A FEMALE *ASILUS CRABRONIFORMIS*, L., DEVOURING ITS MALE.—Mr. B. M. HOBBY exhibited a female *Asilus crabroniformis* taken by Mr. E. R. Goffe in Parnholt Wood, Kings Somborne, Hants., on 19 August, 1930, with the male of its own species as prey. He said that Asilids were well known to capture Asilids as prey, but that he only knew of eleven published records in which the captor was of the same species as the prey. Of these, four were records of the female eating the male; he knew of no example of the male eating the female. The above was the first\*

\* Since the above note was written, my attention has been called to an observation of Y. Xamheu, 1901 (1902), "Moeurs et métamorphoses des Insectes," *Ann. Soc. linn. Lyon.*, 48: 38, in which the author says concerning *crabroniformis*, "... leur voracité les porte à s'attaquer entre eux, et souvent ce sont les mâles qui, au moment du rapprochement des deux sexes, deviennent victimes de leur ardeur. . . ."—B.M.H.—30.i.31.

instance of intraspecific cannibalism in *crabroniformis*. The record was important, inasmuch as there was a considerable amount of evidence from other sources that, in certain species of Asilids, courtship is fraught with grave danger to the male (*vide* Poulton, E. B., "The Courtship of *Dasyopogon (Selidopogon) diadema*," 1906, *Trans. Ent. Soc. Lond.*, 1906: 366-368).

ASSOCIATION OF BIRDS' NESTS WITH NESTS OF INSECTS IN AUSTRALIA.—By W. B. ALEXANDER, M.A.

[Prof. POULTON, in communicating Mr. Alexander's notes, said that the deeply interesting association of birds and insects brought before the Society by Dr. J. G. Myers, dealing with Tropical America (1929, *Proc. Ent. Soc. Lond.*, 4: 80-88); by Mr. Arthur Loveridge and Dr. V. G. L. van Someren, with Africa (pp. 88, 89); by Mr. Stuart Baker and Mr. Davidson, with India (89, 90), would gain much additional significance if it were proved to exist in Australia. He was therefore extremely pleased when his friend Mr. Alexander consented to write an account of the association, so far as it is known to exist in the land which had been his home for so many years.]

Several species of the genus *Gerygone* (or *Pseudogerygone*) have the habit of building their nests in close proximity to the nests of wasps of the genus *Polistes* and perhaps also *Ropalidia*.

The late D. Le Souef appears to have been the first to record the habit here under consideration, noting that in North Queensland birds of this genus were known to the settlers as the "Hornet's Nest Bird." He wrote: "One curious circumstance is that they always seem to build their hanging, dome-shaped nests in close proximity to a wasps' nest, from within a few inches to four feet away, and it is difficult to conjecture for what reason" (*Ibis*, 1898: 59; Campbell, *Nests and Eggs of Australian Birds*, 1900, p. 162). He supposed the bird in question to be *Gerygone personata* (Gould), but the record may refer to *G. flavida*, Ramsay, which was at that time confused with it.

Another record which cannot be assigned definitely to either species is that of Mr. Frank Hislop. He informed the late A. J. North "that there is a species of *Gerygone* in the scrubs of the Bloomfield River, that generally builds on the end of a twig or a lawyer-leaf near a wasps' nest, but owing to the proximity of the latter he has never been able to obtain a specimen or satisfactorily determine to which species the nest belongs" (North, *Nests and Eggs of Birds found breeding in Australia and Tasmania*, 1: 202, 1904).

*Gerygone personata* occurs in the tropical scrubs of Cape York and in New Guinea. Mr. Bertie L. Jardine, who lived for many years at Somerset, Cape York, informed North: "The nest is of an elongated dome shape, having the entrance near the top, which is protected by a projecting hood, and is usually suspended from a pendent supple branch. Strange to say, in almost every instance in which I have found them, they have been built close to a hornet's nest" (North, *l.c.*, p. 203). In October, 1907, Mr. A. R. McCulloch took a photograph showing the nest of the warbler close to that of a wasp, which were shown him by Mr. Jardine (*Rec. Australian Mus.*, 7, Pl. LVII, 1909). Two other visitors to Cape York have noted the same habit. Mr. H. G. Barnard wrote that this species "always builds close to wasps' nests, which have to be burnt before the birds' nest can be examined" (1911, *Emu*, 11: 25).



Dr. W. Macgillivray recorded that "the nest is usually placed near the papery nest of a small yellow hornet or wasp, sometimes near that of the large hornet, and occasionally away from any hornets' nest" (1914, *Emu*, 13: 166).

*Gerygone flavida* occurs in the scrub country from the neighbourhood of Cairns, south to Rockhampton. Mr. E. H. Webb informed North that in the Herbert River district "in 1902 he found two nests, each containing two eggs, and five old nests all of which were built in lawyer-vines in thick scrub and close to hornets' nests" (North, *l.c.*, p. 202). In the same district in 1916 Messrs. A. J. Campbell and H. G. Barnard found four nests. Two of these "were close to wasps' nests. One nest was suspended to a tree overhanging the river, and for photographic purposes we had to smoke out the wasps (or hornets) in order to take a picture" (1917, *Emu*, 17: 21). The picture showing the two nests accompanies their article (Plate III).

In the Rockhampton district Mr. A. H. Chisholm records that of three nests found in October, 1924, one "had the northern *Gerygone*'s trait of being associated with a wasps' nest, the vicious owners of which rendered examination risky" (1925, *Emu*, 24: 164). I was with Mr. Chisholm when this nest was found.

The same habit has been recorded in the case of two other species of *Gerygone*, belonging to the section of the genus which inhabits mangrove swamps. Mr. E. M. Cornwall, describing an inlet on the Queensland coast near Mackay, wrote: "Overhanging the water were many nests of the Brown-breasted Fly-eater (*Gerygone magnirostris*, Gould), placed close to and seeming to enjoy the protection of very active families of large yellow hornets" (1910, *Emu*, 9: 139). Dr. W. Macgillivray, writing of the same species at Cape York, says: "They nest in the mangroves, and the nest is usually placed in close proximity to that of a large hornet which builds a comb nest" (1914, *Emu*, 13: 165).

Mr. G. F. Hill, in an account of his ornithological observations on the north coast of the Kimberley Division of Western Australia, wrote of *Gerygone levigaster*, Gould: "A few nests were found, placed at the extremity of slender branches overhanging water. Two of these nests were built with the openings about 12 inches from large nesting colonies of wasps (*Polistes* sp.). A close examination of these nests convinced me that such sites were chosen, after sound reasoning, as a protection against intruders; at any rate, one is impressed by the activity of these pugnacious little insects in the interests of their own and their neighbours' nests."

It must be added that various other naturalists have recorded finding nests of *G. magnirostris* and *G. levigaster* on different parts of the Australian coast, but have made no allusion to the presence of wasps' nests.

In an article dealing with the curious habit of *G. personata*, the late A. J. North stated: "*Gerygone albigularis*, a migratory species visiting South-eastern Australia during the spring and summer months, often builds its nest in trees affected with scale, and thickly infested with ants" (1909, *Rec. Australian Mus.*, 7: 187). It would require more evidence before it could be decided whether this association is more than fortuitous. But there can be no question that the northern species of the genus deliberately select a site close to a wasps' nest as the most satisfactory situation for their nests.

At least 7 species of kingfishers and 3 species of parrakeets, which lay their eggs in holes, are known to excavate holes for this purpose in the nests of termites. In

some species such a situation is normal and the nest of the bird is only occasionally found in a natural hollow, in others a hole in a tree is the usual situation, but holes are sometimes drilled in termites' nests.

The three parrots of the genus *Psephotus* which usually excavate burrows for nesting in terrestrial termites' mounds, are for this reason known to bushmen acquainted with their habits as "Anthill Parrots." *Ps. pulcherrimus* was formerly found over a large area of Central and Southern Queensland, but is now almost extinct. Carl Lumholtz appears to have been the first to describe its nesting habits. He wrote: "The strange fact about these nests is that they are built in the hills of 'the white ants.' There is an irregular entrance about two inches in diameter and about a foot above the ground. In the interior the parrot makes an opening about a foot high and two or three feet in diameter. None of the building material is carried away, but all the cells and canals are trampled down, so that there remains simply a wall one or two inches thick around the whole nest. Here the female lays five white eggs" (Lumholtz, *Among Cannibals*, 1889, p. 327). Lumholtz was shown these nests by the Messrs. Barnard of Coomooboolaroo Station, and it was to the same naturalists that Campbell and North were indebted for their accounts of the nesting of the species (Campbell, *l.c.*, p. 645; North, *l.c.*, 3: 145). Campbell records that the nest was once found in a hole in a tree. More recently Mr. C. H. H. Jerrard found these parrots nesting in termites' mounds in the Burnett River district and secured excellent photographs of the birds and their nesting-holes (Chisholm, 1922, *Emu*, 22: 4-17, and Pls. V-VIII; also 1927, *Emu*, 27: Pl. 3).

*Psephotus chrysopterygius*, Gould, appears to be confined to the portion of Queensland adjacent to the Gulf of Carpentaria and its nests were not found till 1922, when W. McLennan, collecting for Mr. H. L. White, discovered several nests in the "magnetic" and "spire-shaped" termitaria so plentiful in that region. He secured photographs of the holes and nest (White, 1922, *Emu*, 22: 98 and 109, and Pls. XXX, XXXI, and XXXVIII).

*Psephotus dissimilis*, Collett, sometimes regarded as a western form of the preceding species, occurs in Arnhem Land, North Australia. Mr. C. E. May informed Mr. E. Ashby "that they nested in White Ants' nests (termites). These strange nests are fully the height of a man; the parrots make a hole in the side of the ants' structure and lay their eggs there" (Mathews, 1917, *Birds of Australia*, 6: 429).

Of the kingfishers only one appears always to make a hole in a termitarium for its nest, viz. *Tanyiptera sylvia*, Gould. This species is a summer migrant to tropical Queensland from the north, and its nesting-hole is generally excavated in the low termites' mounds of comparatively soft material found in the dense scrubs, though it is sometimes in an arboreal termitarium (Campbell, *l.c.*, p. 561 and plate opposite p. 562; North, *l.c.*, 2: 377-380).

Another kingfisher, *Halcyon pyrrhopygius*, Gould, found in arid regions throughout Australia, drills its nesting-hole apparently indifferently in banks, walls, etc., and sometimes selects a terrestrial or arboreal termitarium for the purpose (North, *l.c.*, 2: 369-372).

The remaining kingfishers, which are recorded as building in termites' nests, appear only to utilise the arboreal termitaria, and all the species often nest in natural holes in trees. These species are:—*Dacelo gigas* (Boddaert), *D. leachi*, Vigors &

Horsfield, *Halcyon macleayi*, Jardine & Selby, *H. sanctus*, Vigors & Horsfield, and *H. chloris* (Boddaert). In northern and eastern Australia, where arboreal nests of termites are common and all these kingfishers are found, one gets the impression that the kingfishers prefer to nest in the termitaria, as almost all of them seem to contain kingfishers' holes. But such holes are very obvious, whilst nests in natural holes are not discovered unless the bird is seen to enter. I have watched both *Halcyon macleayi* and *H. sanctus* excavating holes in termites' nests. They perch on a convenient branch near the nest and from it fly at full speed against the nest, plunging the bill into it. After each blow they return to their perch for a brief pause before returning to the attack. Operations are continued for many days and as the birds keep up a constant loud screaming while engaged on their task their labours are not easily overlooked. Curiously enough they seem to have no idea of the thickness of termites' nest necessary to contain their burrow and frequently drill holes in termitaria much too shallow for their purpose. It is interesting to note that Campbell records finding a nest of *Dacelo gigas* in the heart of an epiphytic fern, *Platyserium aleicorne*. The basal fronds and situation of these ferns are at times somewhat similar to an arboreal termitarium (Campbell, *l.c.*, p. 551). North gives a photograph of a nest of this species in a termites' nest at a great height in a solitary tree (North, *l.c.*, 2: Pl. A13), also of a nest of *Halcyon macleayi* in a termitarium in a more normal situation (*l.c.*, 2: 368).

[Mr. Alexander also wrote, referring to the extraordinary habit of *Synallaxis* in ornamenting its nest with snake-skin, mentioned by Dr. Myers (*ibid.*, p. 87)—“This habit is found in quite a number of birds. Lists of North American species which use snake-skin for nest-building have recently been given in the ‘Auk.’ The Australian Rifle-bird shares this peculiarity.”—E. B. P.]

FURTHER OBSERVATIONS ON THE POLLINATION OF AUSTRALIAN ORCHIDS BY A MALE ICHNEUMONID.—Prof. POULTON drew attention to recent papers in *The Victorian Naturalist* by Mrs. Edith Coleman and said that he had asked the authoress if she would kindly present separata to the Society. The pollination of *Cryptostylis subulata* (1929, *Vict. Nat.*, 46: 62) had been referred to in our 1930 *Proceedings*, 5: 15, but, since the date of that communication (February 2), photographs of the male *Lissopimpla semipunctata*, Kirb., bearing the pollinia, had been received and were exhibited, also of the same male Ichneumonid with the pollinia of *Cryptostylis erecta*, R. Br. (April 1930, *Vict. Nat.*). A third paper in this publication, for February 1930, gave an account of the pollination of some W. Australian orchids by insects, and announced as regards *Lissopimpla semipunctata*, that this male Ichneumonid has now been shown to visit four Australian species of *Cryptostylis*. Mrs. Coleman was much to be congratulated on her observations which so fully confirm and extend those of Mons. Pouyanne, and Col. M. J. Godfery.

Dr. W. H. THORPE gave an account, illustrated by lantern slides, of the life-history of *Cryptochaetum iceryae* (Diptera, AGROMYZIDAE), a parasite on the fluted scale, *Iceya purchasi*.

POLLEN ON THE WINGS OF *PAPILIO* BUTTERFLIES.—Major R. W. G. HINGSTON said that in the *Proceedings* of the Society, 4: 108, there is a record of a *Papilio*



butterfly with a quantity of pollen on its body and wings, the specimen having been exhibited by Professor Poulton. The precise manner in which the butterfly came by the pollen had not received proper explanation.

Several years ago the speaker made an observation in India which may help to throw some light on the matter. In a disused garden at Fyzabad there grew a plant with a brilliantly coloured flower, the Climbing Glory Lily, *Gloriosa superba*. It climbed through a tangle of thick scrub, clinging to the vegetation by means of hooks attached to the tips of its leaves. Its flower was a vivid crimson, highly conspicuous in the green vegetation. The structure of this flower was quite out of the ordinary. Its crimson petals stood erect, six in number, crumpled in appearance, with their apices turned in above and enclosing between them an empty globular space. The stamens were not inside this space, but were arranged in a circle of six



radiating stalks below and around the base of the petals. The stalks were nearly horizontal, but each had a slightly upward curve, and supported an anther at its extreme tip. Thus the stamens stood well clear of the petals and were exposed throughout their whole length. The anthers were loosely applied to their tips, each being balanced on a kind of hinge so as to oscillate at the slightest touch. The position of the pistil was equally peculiar. Its base was not inside the ring of petals, but formed a conspicuous distension underneath them. To the bottom of this distension was attached the filament, a straight stalk directed outward and slightly upward into the V-shaped gap between two of the stamens. It ended in a viscid stigma formed of three radiating points. There was, therefore, a complete inversion of the normal position of the floral organs.

The reason for this inversion becomes evident when the manner in which the flower is fertilised is watched. It is not much noticed by the generality of insects, nor are small butterflies attracted to it. The swallowtails are its favoured visitors, particularly the widespread *Papilio demoleus*, and less frequently *Papilio polytes*.

It is obvious that they see the glow of colour from a little distance and immediately come down to examine the flower. They then try to get at the base of the petals. At that point there must be some sweet secretion which is highly attractive to them. But in order to reach the base of a petal the butterfly must get itself between two of the stamens. This it does and clutches hold either of their stalks or of the base of the pistil. It then uncoils its proboscis and pushes it into the base of the petal which is there folded so as to form a tube. But the point to be noticed in this connection is that while the butterfly has its proboscis in the petal its wings all the time continue to vibrate. This is the customary habit of these Papilios. Their wings never come to rest, at least on this particular flower. As a consequence of this vibratory movement their wings necessarily beat against the anthers. This hammering shakes the pollen from the anthers, particularly as the pollen-bearing surfaces of the anthers are on the parts that receive the strokes of the wings. The pollen that is shaken off sticks to the wings, and may be seen attached to their under surfaces in the form of a golden-coloured streak. But the butterfly's motion is not a simple hammering; in addition its body moves quickly up and down, a movement which seems to be necessary to enable it to extract the juice. Thus by virtue of the double motion, the pollen is, as it were, screwed from the anthers and spread widely over the butterfly's wings. The butterfly, having exhausted the juice at one petal, passes on to another, and then to another, each time getting in between a pair of stamens and adding further to its dusting of pollen. But as it works its way round the flower it will necessarily come to the pair of stamens which have the filament of the pistil situated between them. It goes forward in the usual manner to get its proboscis into the base of the petal, but instead of pushing itself between two stamens it will now have to push itself between a stamen and a pistil. One wing will beat against a pollen-covered anther, the other against a sticky stigma. Thus the stigma will receive pollen hammered on to it by the vibrating wing. Thus it is seen how admirably adapted the long pistil and stamens are to the large size of the wings of *Papilio* butterflies.

It seemed to be a point of particular importance that the anther is hinged so loosely to the tip of the stamen as to swing about at the slightest touch. If it were tightly fixed in position, when the butterfly entered between the stamens, its wings would hammer against rigid points; and as butterflies are very careful of their wings they would scarcely beat them against rigid objects which must necessarily injure the fragile wing-scales. But the anther in this case is so delicately balanced that it turns aside on the slightest touch of the wing, and since it is joined to the stamen by a universal hinge, it offers no injurious resistance to the butterfly during the hammering and screwing motion that takes place.

The inversion of the floral organs is evident only when the flower is fully developed. The flower before it opens is not inverted. It hangs downwards with its petals enclosing the stamens after the manner of most flowers. Also its colour is then quite inconspicuous, being green like the surrounding leaves. The inversion of the organs takes place fairly rapidly. One flower which in the morning was almost wholly green with its petals hanging down in the unopened state had by evening expanded its petals widely. They had raised themselves into a horizontal position and radiated from the flower like the points of a star. The six stamens

and the pistil filament still hung down in a pendulous bunch beneath them. By the following morning the petals were erect; their tips were beginning to turn inward so that they had almost come to the finished state. The stamens and pistil filament had raised themselves to the horizontal. The flower had come to almost its final arrangement, but had not yet put on that full glow of colour which would develop during the day.

It would thus seem that this arrangement of floral parts; the inversion that takes place at the time of full development; the erect petals with tubular bases; the long, exposed, horizontal, slightly upturned stamens; the wide V-shaped spaces between them; the exposed stigma in the gap between two stamens; the anthers fixed loosely on universal hinges; the fiery colour of the flower and its sweet secretion have all been developed to secure cross-fertilisation through the wing-hammerings of *Papilio* butterflies.

THE FORMATION OF THE PERITROPHIC MEMBRANE IN VARIOUS INSECTS.—Dr. WIGGLESWORTH recalled that at the last meeting of the Society he had shown how the peritrophic membrane of the tsetse-fly was produced by a fluid secretion being passed through an annular mould or press at the anterior end of the mid-gut. A similar mode of origin had been described by Vignon, in 1900, in the larva of *Chironomus*. It seemed probable, therefore, that analogous mechanisms would be present in other insects; and such mechanisms had, in fact, been found in the larvae of mosquitos and other Nematocera, in the larvae and adults of Hymenoptera, in the larva of the mealworm (*Tenebrio*) and the adult of the ladybird (*Coccinella*) among Coleoptera, in the larva of *Chimabache* and other Lepidoptera, in flea larvae and termites, in the adult of *Hemerobius* among "Neuroptera," in the larva of *Aeschna*, and in the cockroach (*Blatella*) and the earwig (*Forficula*). They doubtless existed in many other forms.

Some of these press mechanisms, many of them complicated and beautiful structures, were illustrated by means of lantern slides. A detailed account of them will be found in 1930, *Quart. J. Micr. Sci.*, **73**: 593-616.



## ANNUAL MEETING.

Wednesday, January 21st, 1931.

Dr. K. JORDAN, President, in the Chair.

Dr. S. A. NEAVE, Secretary, read the names of the Fellows nominated as Officers and Council for the ensuing year, and announced that they had been duly elected in accordance with the Bye-Laws.

He then read the following :—

### Report of the Council.

The outstanding event during 1930 was the Opening of the New Meeting Room on the 7th May, by the Rt. Hon. Christopher Addison, M.P., then Parliamentary Secretary, and now Minister of Agriculture. A full report of the Meeting and of the speeches on that occasion have been published in the *Proceedings*. In addition to Mr. Lloyd's magnificent gifts, of which mention has been made in previous reports, the Society is greatly indebted to other generous Fellows, Dr. K. Jordan and Mr. H. Willoughby Ellis having made contributions to the Meeting Room Fund, and Mr. R. Adkin having presented a very fine Epidiascope and screen. The Society has also received the sum of £100 to cover the cost of an additional bookcase for the Library from Dr. R. Stewart MacDougall in memory of his wife.

Since the last Annual Meeting one Special Life Fellow, Mr. E. A. Atmore, and the following 8 (17) Fellows have died, or their deaths have been ascertained, the numbers in brackets in this and the following paragraphs indicating the corresponding numbers for last year :—W. BARNES, G. C. DUDGEON, Prof. SELWYN IMAGE, G. T. LYLE, W. H. MILES, F. V. THEOBALD, Prof. E. G. R. WATERS, and Dr. J. WATERSTON.

The following 9 (16) Fellows have resigned :—L. A. BOX, G. V. BULL, Rev. T. G. DIGGES, R. T. MILLOTT, C. P. BRADSHAW, F. P. DODD, J. H. JURRIANSE, K. M. SMITH, and R. C. WOOD.

The following 3 (5) have been removed from the List of Fellows in accordance with the Bye-Laws, Chapter XVI, section 3 :—O. C. CASSELS, A. E. DROSTE, J. S. SHIBUYA.

During the year one Special Life Fellow, Mr. E. A. ATMORE and 39 (23) Ordinary Fellows have been elected, which more than compensates for the losses during the year, the Fellowship showing a nett increase of 18 during 1930. The Society is now larger than it has ever been in the course of its history, and it consists of 10 Honorary Fellows, 4 Special Life Fellows, and 711 Ordinary Fellows.

The meetings have again been well attended, the average number of Fellows and Visitors at each being 62.

The two Parts of the *Transactions* for 1930 (Vol. 78) were issued on 30th June and 31st December respectively. They comprise 20 papers, by the following authors :—Mr. H. E. ANDREWES, 1; Mr. K. G. BLAIR, 1; Mr. H. E. BOX, 1; Mrs.

M. D. BRINDLEY, 1; Mr. P. A. BUXTON, 1; Dr. G. D. HALE CARPENTER, 1; Dr. E. A. COCKAYNE, 2; Mr. C. L. COLLENETTE, 1; Mr. J. E. COLLIN, 1; Mr. H. ST. J. K. DONISTHORPE and Mr. D. S. WILKINSON, 1; Miss A. M. EVANS, D.Sc., 1; Mr. H. D. FORD and Mr. E. B. FORD, 1; Mr. A. H. HAMM and Mr. O. W. RICHARDS, 1; Mr. F. F. LAIDLAW, 1; Mr. P. I. LATHY, 1; Mr. E. MEYRICK, 1; Mr. M. E. MOSELY, 1; Dr. W. H. THORPE, 1; Mr. C. B. WILLIAMS, 1. Of these, 6 deal with Lepidoptera, 3 with Coleoptera, 3 with Diptera, 3 with Hymenoptera, 2 with Rhynchota, 1 with Odonata, 1 with Trichoptera and Plecoptera, and 1 with Insect Teratology. The volume consists of 370 pages, and is illustrated by 30 plates, of which 2 are in colour, the remainder being in black and white.

Material assistance from a number of sources has again been received toward the cost of the volume, and the following contributions have been received or promised in respect of it :—Prof. POULTON has authorised a grant from funds at his disposal covering part of the cost of the paper by Messrs. HAMM and RICHARDS, the complete cost of Miss EVANS' paper, and the cost of the coloured plate illustrating the paper by Messrs. FORD and FORD. Mme. FOURNIER defrayed the cost of the coloured plate illustrating Mr. LATHY's paper. Mr. BLAIR contributed part of the cost of the plate illustrating his paper, and Dr. COCKAYNE has undertaken to defray the cost of the plates in his paper on Insect Teratology.

The volume of the *Proceedings* will consist of about 145 pages illustrated by 7 plates and a few text-figures. Prof. POULTON has also given considerable assistance towards the cost of printing and illustrating this volume.

The detailed work of the Society's business has been carried on by the Finance Committee under the Chairmanship of Mr. H. WILLOUGHBY ELLIS, the Publication Committee under that of Prof. E. B. POULTON, and the Library Committee under that of Mr. R. ADKIN. The special Housing Sub-Committee under the Chairmanship of Mr. E. C. BEDWELL appointed in 1928 to deal with the building operations undertaken by the Society, completed its duties with the Opening of the New Meeting Room. The thanks of the Council are again due to those Fellows who have served on these Committees, more especially to those with specialised knowledge who have been of great service to the Housing Sub-Committee.

The Library, both in its organisation and in the growth of its contents, has made remarkable progress during the year. A generous grant of £500 was made to the Society by the Carnegie United Kingdom Trustees for the purchase of books. Other donations to the Library during the year make a long and imposing list. Early in January the Eaton Collection of Books was received. These were presented by Mrs. EATON in memory of her husband. Mrs. BANKES also presented a selection of books from the Library of the late Mr. EUSTACE R. BANKES. Mr. P. I. LATHY presented a unique copy of "Thèses Entomologiques, I. Note sur Agrias," including a proof set of the plates uncoloured. Dr. JORDAN presented several hundred Separata, as did Mr. TALBOT and others. Full details of these valuable additions will appear in Part III of our *Proceedings*, which will be published in March.

Further progress has been made with the heavy task of re-organising and cataloguing the very large collection of Separata. Some 3,000 have been dealt with to date, but about three times as many more still require critical examination. Some very rare pamphlets have, however, already been brought to light in the

process. In order to make these Separata readily available, they have all been arranged alphabetically by authors and can now be found without difficulty.

It is much to be desired that Fellows will offer copies of their entomological publications to the Society, and so assist in maintaining a high standard of completeness in its collection. The use of the Library has considerably increased, the number of books issued on loan amounting to 863 (546) borrowed by 346 (68) Fellows.

The Hon. Secretary of the Committee for the Protection of British Lepidoptera reports that the season at Wood Walton Fen would have been a successful one for *Chrysophanus dispar batavus*, if it had not been for a heavy flood in May which drowned many larvae in the lower portions of the Fen. It is interesting to note, however, that a considerable number of larvae which did not emerge from hibernation until late in May almost made up for the loss.

The loss through attack by the Tachinid parasite, *Phryxe vulgaris*, was small compared with the previous year. In spite of the bad weather in July and August, fair numbers of imagines were observed on fine days, and a good quantity of eggs were laid. A number of larvae are again being hibernated in confinement as a precautionary measure.

The colony at Wicken Fen made a successful start. The docks planted in the Reserve area made wonderful growth. In order to test whether the larvae would be attacked by parasites, 45 larvae of *C. dispar batavus* were placed on the docks on 7th June. These were carefully watched by the keeper, who reported that the whole number, except one which disappeared, pupated safely and duly emerged. Sixty pupae were sent down later and some imagines. Some more docks are to be planted at Wicken Fen this spring.

A third colony has been started on private ground in the Kennet Valley under the charge of the Curator of Reading Museum, and a number of eggs and larvae were observed on the docks last autumn.

A fourth colony was started on private ground near Stockbridge in Hampshire; but it is too early yet to report with what success. *C. dispar rutilus* has again been observed in Norfolk. It is satisfactory to note that this subspecies has survived without any assistance since it was first put down in 1926.

The Society for the Promotion of Nature Reserves again made a grant towards further clearing at Wood Walton Fen, and Lord ROTHSCHILD has again contributed most generously towards the expenses.

*Melitaea athalia* is now firmly established in various private woods. Progress has also been made towards the protection of other British species.

The Report was adopted on the motion of Mr. R. ADKIN, seconded by Prof. E. B. POULTON.

### The Treasurer's Report.

Capt. A. F. HEMMING, Treasurer, then read the following Report :—

In presenting the Society's accounts for the year 1930 it is desirable in the first instance to draw attention to the fact that their form has been entirely recast. Hitherto the Treasurer has presented annually a statement of receipts and payments for the year, and corresponding statements of the subsidiary Fund Accounts,



together with a combined statement of the assets and liabilities as at the end of the year of the General Fund and of the Subsidiary Funds.

The Accounts now presented have been prepared on an Income and Expenditure basis. It will thus in future be possible to estimate closely the normal income and expenditure of the Society and to judge what sum will, in any given year, be available either for investment or for new forms of expenditure, after provision has been made to meet all liabilities. For the current year the excess of ordinary income over ordinary expenditure is shown as £337 12s. 2d., but if regard is paid to the large sum (£313 7s. 3d.) transferred this year to the Repairs to Premises Fund, it may be assumed that, on the basis of the present scale of expenditure, income will normally exceed expenditure by over £400 per annum.

The income from subscriptions and admission fees is higher than the receipts under those headings in 1929. The sales of publications continue to expand satisfactorily. The income on this account in 1930 amounted to £566 12s. 6d., an increase of £82 9s. 4d. over the receipts from sales in the previous year. The general expenditure of the Society has been heavier than usual. This has been due in part to the large sum of £313 7s. 3d. required to be transferred to the Repairs to Premises Fund and to the necessity of buying furniture for the library and the office consequent upon the changes involved in the housing scheme and in part also to increases in respect of salaries and wages. As regards salaries, 1930 was the first full year in which it was necessary to provide for the Registrar's salary, and, as regards wages, the increase has been due to the expansion of the Society's premises which has made it necessary to provide additional assistance for the office keeper. The expenditure on publications has amounted to approximately £750.

The Library has been especially fortunate during the year. Not only has it been possible almost to double the sum transferred to the Library Fund from the General Fund, but in addition through the generosity of the Carnegie (United Kingdom) Trustees the sum of £500 has been put at the disposal of the Society for the purchase of rare books. Of this grant, the sum of £346 0s. 4d. was expended on book purchases during the year under review and the remainder is available for further purchases this year. During the year the Library has been re-valued and is now estimated to be worth £10,000.

The past year witnessed the completion of the Housing Scheme with the opening of the New Meeting Room. The net cost to the Society of the scheme as a whole (including the cost of converting the old meeting room into the present library, etc.) amounts to £7,167 3s. 4d. During the year the sum of £1,154 19s. 8d. was transferred to the Housing Fund, which was also credited with the proceeds (amounting to £340 8s. 7d.) of the sale of the investments credited in last year's Accounts to General Reserve. As will be seen from the Council's Report, the Fund also received during the year generous gifts from the President and from Mr. Willoughby Ellis.

In this way immediate provision has been made for meeting the cost of the New Meeting Room scheme. This, however, has only been possible by incurring an expenditure of £817 7s. 6d. in excess of income during the past year. After deducting the excess of assets over liabilities as at December 31st, 1929, there remains in respect of the General Fund at December 31st, 1930, an excess of liabilities over assets of £524 15s. 2d.

The foregoing figures show clearly how great has been the strain that has been imposed on the Society's finances by the new Housing Scheme. The Society's general financial position is, however, sound, and now that the scheme is completed it is to be hoped that with rigid economy it may soon be possible to liquidate the present excess of liabilities over assets in the General Fund of the Society.

The Report and Accounts were adopted on the motion of Mr. R. W. LLOYD, seconded by Mr. A. HALL.

The PRESIDENT then read his address, and at its conclusion a vote of thanks to him, coupled with the request that it might be printed in the *Proceedings*, was moved by Mr. H. WILLOUGHBY ELLIS, seconded by Prof. E. B. POULTON, and carried unanimously.

A vote of thanks to the Officers for their services during the year was then passed on the motion of Dr. R. STEWART MACDOUGALL, seconded by Mr. W. H. T. TAMS, and Capt A. F. HEMMING and Dr. S. A. NEAVE briefly replied.

## THE ENTOMOLOGICAL SOCIETY OF LONDON.

## TREASURER'S STATEMENT OF INCOME AND EXPENDITURE for the Year ended December 31st, 1930.

(Presented at the Annual Meeting, January 21st, 1931.)

## GENERAL FUND.

INCOME.			EXPENDITURE.		
	£	s. d.		£	s. d.
To Subscriptions—			By House Expenses—		
Received in advance for 1930	...	49 11 8	Wages	...	207 5 1
Received in 1930 for 1930	...	1,231 6 6	Fuel, Gas and Electric Light	...	112 17 0
Received in 1930 for previous years	...	74 10 9	Insurance and Water	...	26 7 4
			Repairs Fund Transfer	...	313 7 3
			Miscellaneous	...	33 1 10
Less Subscriptions in Arrear at 31st December, 1929	1,355 8 11				692 18 6
	118 12 9				
	1,236 16 2		Office—		
Add Subscriptions in Arrear at 31st December, 1930	...	...	Salaries	...	523 9 2
—Valued at	1,351 16 2		Printing and Stationery	...	51 18 11
	122 17 0		Postage	...	33 8 7
			Audit Fee	...	10 10 0
Admission Fees	...	...	£ s. d.		
Publications—	...	...	Superannuation	...	6 9 7
Sales	...	...	Less Employees' Contribution	...	4 16 0
Donations towards cost	...	...			
Interest on Deposit at Bank	...	...	Furniture	...	1 13 7
Dividends on Investments (gross)	...	...	Miscellaneous	...	18 17 6
Rents from Sub-Tenants	...	...			22 5 10
Contributions by Sub-Tenants towards House Expenses	...	...	Library—		
Hire of Meeting Room	...	...	Library Fund Transfer	...	155 13 6
Miscellaneous	...	...	Repairs to Premises	...	41 17 1
Reserve for amounts due to Society irrecoverable at	...	...	Fee for Valuation of Library	...	10 0 0
31st December, 1929, written back	...	...	Furniture	...	32 6 6
					239 17 1
TOTAL ORDINARY INCOME			Cost of Publications—		
			Printing and Distribution	...	613 7 9
			Illustrations	...	144 14 9
			Donation to Zoological Record	...	...
			TOTAL ORDINARY EXPENDITURE		2,378 1 8
			Balance carried down, being excess of Ordinary Income		337 12 2
			over Expenditure		...
					£2,715 13 10



## STATEMENT OF INCOME AND EXPENDITURE for the Year ended December 31st, 1930.

## GENERAL FUND (Continued).

INCOME.		EXPENDITURE.	
	£ s. d.		£ s. d.
To Balance brought down	... ..	By Transfer to Housing Fund	... ..
" Excess of Expenditure over Income carried to Balance Sheet	... ..		
	327 12 2		1,154 19 8
	817 7 6		
	<u>£1,154 19 8</u>		<u>£1,154 19 8</u>

## WESTWOOD BEQUEST FUND.

	£ s. d.		£ s. d.
To Interest on Birmingham Stock	... ..	By Excess of Income over Expenditure carried to Balance Sheet	... ..
	7 3 8		7 3 8

## HAMILTON DRUCE BEQUEST FUND

	£ s. d.		£ s. d.
To Interest on New Zealand Stock	... ..	By Transfer to Library Fund	... ..
	43 16 6		43 16 6

## CARNEGIE BOOK PURCHASE FUND.

	£ s. d.		£ s. d.
To Grant from Carnegie United Kingdom Trust	... ..	By Expenditure on Books	... ..
	500 0 0	" Balance carried to Balance Sheet	... ..
	<u>£500 0 0</u>		<u>£500 0 0</u>

## LIBRARY FUND.

	£ s. d.		£ s. d.
To Transfer from Hamilton Druce Bequest Fund—Interest on New Zealand Stock	... ..	By Expenditure on Books	... ..
" Transfer from General Fund	... ..	" Binding, Repairs and Insurance...	... ..
" Miscellaneous	... ..		
	43 16 6		111 18 9
	155 13 6		89 12 8
	10 0		201 11 5
" Excess of Expenditure over Income carried to Balance Sheet	... ..		
	1 11 5		
	<u>£201 11 5</u>		<u>£201 11 5</u>

# STATEMENT OF INCOME AND EXPENDITURE for the year ended December 31st, 1930.

REPAIRS TO PREMISES FUND.		
	£	s. d.
INCOME.		
To Transfer from General Account ...	...	...
	313	7 3
EXPENDITURE.		
By Expenditure on Repairs ...	...	...
„ Expenditure transferred from Housing Fund ...	...	...
„ Excess of Income over Expenditure carried to Balance Sheet ...	...	...
	291	9 2
	21	18 1
	£313	7 3

## HOUSING FUND.

To Transfer from General Reserve ...	£	s.	d.	£	s.	d.
" Profit on realisation of General Reserve ...	...	322	1	7	...	...
" Transfer from General Fund ...	...	18	7	0	...	...
" Donations ...	...	1,154	19	8	...	...
" Interest on Deposit ...	...	100	0	0	...	...
	...	7	8	4	1,602	16
					7	
					1,602	16
					7	
					£1,602	16
					7	
					£1,602	16
					7	

## BALANCE SHEET, December 31, 1930.

## GENERAL FUND.

LIABILITIES.		ASSETS.	
£	s. d.	£	s. d.
To Amount overdrawn at Bank	...	By Sundry Debtors—	
" Donations for Specific Purposes unpaid	...	Subscriptions valued at	115 0 0
" Sundry Creditors	...	Admission Fees	15 15 0
" Subscriptions received in advance	...	Publication Sales	20 18 8
" General Reserve as per Trust Account	...	Contributions to Cost of Publications	60 5 0
" Less Transferred to Housing Fund	...	Rent and Contributions to House Expenses	112 10 0
		Income Tax Recoverable	7 1 3
		Sundries	6 17 10
		338 7 9	
		Excess of Liabilities over Assets—	
		Excess of Expenditure over Income for year to date	817 7 6
		Less Excess of Assets over Liabilities at 31st December, 1929	292 12 4
		£863 2 11	

## WESTWOOD BEQUEST FUND.

£	s. d.	£	s. d.
To Excess of Assets over Liabilities at 31st December, 1929	144 9 8	By £239 12s. 4d. Birmingham Corporation 3% Stock 1947 at cost	...
Add Adjustment of Investment to cost	106 4 8	(Value at date £158 2s. 7d.)	...
250 14 4		Income Tax Recoverable	...
Add Excess of Income over Expenditure for year to date	7 3 8	Cash at Bank	...
		257 18 0	
		£257 18 0	

## HAMILTON DRUCE BEQUEST FUND.

£	s. d.	£	s. d.
To Excess of Assets over Liabilities at 31st December, 1929	920 8 11	By £1,095 15s. 6d. New Zealand 4% Stock 1943/1963 at cost	...
Add Adjustment of Investment to cost	79 11 1	(Value at date £975 5s. 2d.)	...
1,000 0 0		£1,000 0 0	

## CARNEGIE BOOK PURCHASE FUND.

£	s. d.	£	s. d.
To Sundry Creditors	...	By Balance of Grant due	...
" Excess of Income over Expenditure for year to date	...	" Cash at Bank	...
		£232 19 11	



## LIBRARY FUND

LIABILITIES.		ASSETS.	
To Sundry Creditors	£ s. d.	By Library Furniture and Fittings (Not valued)	£ s. d.
" Excess of Assets over Liabilities at 31st December, 1929	22 6 11	" Library Books (Valued at £10,000)	...
" Less Excess of Expenditure over Income for year to date	1 11 5	" Income Tax Recoverable	4 7 7
		" Cash at Bank	77 4 2
			<u>£81 11 9</u>

## REPAIRS TO PREMISES FUND.

To Sundry Creditors	£ s. d.	By Cash at Bank	£ s. d.
	...	" Excess of Liabilities over Assets at 31st December, 1929	21 18 1
		" Less Excess of Income over Expenditure for year to date	21 18 1
			<u>£9 12 6</u>

## HOUSING FUND.

To Sundry Creditors	£ s. d.	By Freehold Premises, 41, Queen's Gate, at cost	£ s. d.
" Excess of Assets over Liabilities at 31st December, 1929	694 17 0	" Cost of New Meeting Room Scheme, 1929/1930—	6,250 0 0
" Add Income for year per Income and Expenditure Account	11,814 6 9	" Expenditure during 1929	4,197 8 2
	1,602 16 7	" Expenditure during year	3,144 7 1
		" Deduct Cost of Repairs charged to Repairs Fund	7,341 15 3
			<u>13,417 3 4</u>
		" Cash at Bank	7,167 3 4
			<u>£14,112 0 4</u>

## COMPOUNDING FUND.

To Excess of Assets over Liabilities at 31st December, 1929	£ s. d.	By £1,354 2s. 2d. 2½% Consols valued at 6th March, 1929	£ s. d.
" Add Adjustment of Investments to value at 6th March, 1929	1,159 7 6	" £532 3s. 3d. 4% Consols valued at 6th March, 1929	737 19 9
	25 12 6		447 0 3
			<u>1,185 0 0</u>
		(Representing Estimated Liability of Fund at that date—subject to revision quinquennially.)	
			<u>£1,185 0 0</u>

(Signed) A. F. HEMMING, *Treasurer*.

We have examined the above Balance Sheets and Accounts with the Books and Vouchers of the Society and certify them to be correct. The Solicitors have certified to us that they hold the deeds of 41, Queen's Gate for safe custody on behalf of the Society, and we have verified the other Investments and Bank Balances.

23, *Queen Victoria Street*,*London, E.C. 4.*

15th January, 1931.

(Signed) W. B. KEEN & Co., *Chartered Accountants*.

## THE PRESIDENT'S ADDRESS.

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LADIES AND GENTLEMEN,

The Secretary and Treasurer have given us a concise survey of the state of our finances and of the principal events in the life of the Society during the year which closes with this Annual Meeting. Though the Reports deal only with facts which are now of the past, the statements contained therein have released, or created, in our minds thoughts connecting the past with the future, what has happened being the parent of what will happen. That these thoughts are pleasant and buoyant is in a large measure due to the untiring devotion with which the Secretary and Treasurer have attended to the work their honorary offices have placed on them. The chief event during 1930 was the inauguration of this Meeting Room by the present Minister of Agriculture. The possession of this house, with a valuable and ever-increasing library and a unique Meeting Room, is a sign of prosperity, and since the pure sciences and arts flourish best when the population is prosperous and therefore has the means to transcend bare utilitarianism, we have, in face of the general economic unrest and depression, every right not only to congratulate ourselves on the present situation of the Society, but to look into the future with great confidence. To my mind, however, of greater importance than prosperity as such is the fact that this situation is entirely due to the love which the fellows of the Society feel for Entomology, a devotion which makes sacrifice a pleasure, and that for this reason these premises may truly be taken as an emblem of independence, as a sanctuary for pure Entomology. I emphasise the necessity of this independence, for the very importance which Entomology has for the economic and hygienic welfare of humanity constitutes a danger which must not be overlooked, a danger which is actual in a certain country. In a period of great economic pressure the clamour of the uninitiated public opinion for applied science might easily warp the judgment of a government and might lead it to decisions which would cripple pure science, forgetting under the stress of the circumstances of the moment that pure research is the indispensable basis of all applied science and that to press for quick results in research is most disastrous, quick spelling nearly the same as quack. At the expiration of my term of office, I should like to express the wish that this Society may grow so powerful economically and scientifically that it can successfully act as guardian of pure Entomology at all times. The applied branch of our science does not require this protection, its own function being that of a protector of mankind. When the earth gets so overpopulated that all efforts must be directed to producing and saving food, pure science and the arts will be starved to death, but in this struggle for bare existence, Applied Entomology will be as much a necessity as ever.

In his speech at the inauguration ceremony the Right Honourable Dr. Christopher

Addison prophesied that the near future would bring a considerable increase in the list of the fellows of the Society. The prophecy has already come true to some extent, inasmuch as the number of fellows elected in 1930 surpasses the number which have died or otherwise been removed from the list, and we may hope that the increase will be continuous, which would give pleasure to all of us and in particular gladden the heart of our Treasurer.

It is a touching custom in this Society that the president includes in his Address at the Annual Meeting the obituaries of the Fellows who have died during the past year. I have followed this custom; but as most of you have already seen, in the Entomological periodicals or elsewhere, accounts of the lives of the departed friends and colleagues, I will to-night read the obituaries of only two fellows who were in their time familiar figures at our meetings and whose characters appealed to me personally very strongly, Professor Selwyn Image and Dr. James Waterston.

After having taken his degree at Oxford in 1872, SELWYN IMAGE entered the Church, his poetic leanings calling him to the service of mankind; but after a short number of years he gave up this vocation in order to devote himself entirely to literature and art. He made a reputation as a poet and painter and especially as an expert on stained glass, and was in 1910 appointed Slade Professor of Arts at Oxford. His entomological pursuits centred on Lepidoptera, and he frequently attended the meetings of our Society in the old rooms at Chandos Street. The minds of artists and poets have much in common with those of scientists. Artist and poet correlate what they observe and try to express its inner meaning in a picture by brush or word, much as the taxonomist aims at revealing in his classification the relationship of the species. Selwyn Image's paintings show a careful selection of detail, gathered on his rambles after insects, and a purposeful grouping in accordance with his poetic perception of nature, and, as a designer, his work recalls the definiteness which we find in a good description of a species. The design of the Society's great seal is one of the gifts for which we are indebted to him. When meeting Professor Image, one received the impression that he was standing above the troubles of this world, being so strong in mind as to be able to conquer or ignore them. Always courteous, kind and serene, he was a rare and remarkable man. Born in 1849, he reached the age of 81 years. He became a fellow of the Society in 1897.

In many ways Dr. JAMES WATERSTON was different from Professor Image, but a character no less lovable. Instead of reaching the age at which one must expect to depart, he was carried away by an illness in his 52nd year. Like Selwyn Image he entered the ministry and then changed his vocation, in his case for reasons of health. Born in Paisley, he owed his scientific training to Edinburgh, where he obtained honours in Divinity, Philosophy and Science, an achievement thoroughly characteristic of my late friend. He went to the Shetlands as a Free Church Minister, and during the years spent in that rough climate on the lonely islands he became intimate with many aspects of nature and acquired first-hand knowledge of the life of the creatures of sea and land. Among the insects he was most attracted by Ectoparasites, of which he could obtain in the North a considerable number of



species, particularly from birds and their nests. When he had joined in 1914 the Imperial Bureau of Entomology and in 1920 had become a member of the staff of the British Museum, his official time was devoted to Hymenoptera, especially to the economically important Chalcids, in the study of which his skill with dissecting pin and microscope stood him in good stead. But in spite of the overwhelming mass of material of the order to which he had to attend, he found time to continue his studies on the Mallophaga. He had almost completed a monograph of the British species of these parasites, when death cut his life short. A similarity of interests brought us together and our intimate interchange of ideas gave me an insight into a character which I learned deeply to admire. The combination of minister and all-round naturalist had preserved him from the onesidedness of judgment which is so frequently the result of a specialised training, and he always wished to go to the root of things. As a student of Mallophaga he carried forward the discovery by L. Vernon Kellogg that the classification of bird-lice often throws light on the relationship of birds and not rarely contradicts the Ornithologist. The discovery is similar in scientific interest to the results obtained by the albumen tests in plants, a test which had already been carried out in many cases by caterpillars long before any human being became scientific, probably long before the dawn of the human species. In the British Museum, James Waterston took advantage of the opportunity offered by the collection of birdskins to search the skins for bird-lice, and as he succeeded in thus obtaining these parasites from many different kinds of birds, he got a profound understanding of the correlation between the evolution of the birds and that of their parasites. It is sincerely to be hoped that Dr. Waterston's manuscript on the Mallophaga of Great Britain will be completed by some competent entomologist, and the work issued in memory of this thorough scientist. We can ill spare him, but life is a capital loaned to us, afflictions are the interest thereon, and when the time is up, we all pay it back in full, there being no defaulters.

Like most Entomologists, E. A. ATMORE, a pharmacist by profession, pursued the study of insects in his spare time for the pure love of the subject. As a permanent resident of Lynn, his entomological activities were principally devoted to the faunistic exploration of his home county, Norfolk. He gained a considerable knowledge in all Orders of Hexapods, but gave preference to the Coleoptera, Hymenoptera and Diptera, of which he had an extensive local collection. His contribution to entomological literature consists of articles on his favourite groups. The Kings Lynn Museum frequently received from him gifts of specimens to supplement its collection. He joined the Society in 1886 and became a Special Life Fellow in 1930.

E. R. BANKES, who was elected a fellow of the Society in the same year as E. A. Atmore, died at Corfe Castle, his residence, at the age of 68. Though his social position in the county of Dorset made many demands on him, he found time and energy for research on insects, of which he acquired an all-round knowledge. He concentrated on Micros and was indefatigable in the investigation of the habits of this group of Moths, and his labours were rewarded by the discovery of new species and the life-histories of others. His extensive knowledge of these small and fre-

quently very difficult insects was of great help to those Lepidopterists who were so fortunate as to come into personal contact with him and to have him as a guide in the field. He presented his collection to the British Museum.

The Society mourns the loss of another Microlepidopterist in Professor E. G. R. WATERS, who passed away in March 1930 at the early age of 39. A professor of Romance languages at Oxford, he devoted much of his spare time to the study of the Micros of Oxfordshire, astonishing his entomological friends by his skill in manipulating difficult specimens and by the thoroughness of his work. He was ever ready to demonstrate his methods and to extend his help to anyone who was interested in the subject. His death has cut short the distinguished career of a Philologist and Entomologist. His collection is in the University Museum at Oxford.

By the death of Dr. W. BARNES Entomology has been deprived of one of the foremost students of North American Lepidoptera. He died at Detroit, Illinois, in May 1930, aged 60. After having received his degree in 1886 at Harvard University, Cambridge, Mass., he settled in his native town of Detroit as a physician, specialising in surgery with great success. When we saw him but a few years ago, he seemed to be full of energy, and the news of his death came somewhat as a shock. As an Entomologist he restricted his field to the Lepidoptera of America north of Mexico; but within these boundaries there was no limitation. With the energy of a typical American he brought together, almost regardless of expense, the largest collection of Butterflies and Moths of the Nearctic Region which has ever been made. This vast material formed the basis of a periodical issued as *Contributions to the Natural History of the Lepidoptera of North America*, of which 5 volumes have appeared, all abundantly illustrated. Dr. Barnes agreed with Charles Oberthür in postulating a long series of each species as a necessity for the study of variability and variation; but his descriptions, published in collaboration with successive entomological secretaries, are short and usually to the point, while in Oberthür's *Études Comparées* the author's Swabian descent is revealed by the great and sometimes overpowering flow of language. Dr. Barnes left his collection to the Macon County Hospital, in which he was much interested, the object being that the collection should be sold for the benefit of the hospital.

G. T. LYLE, born in 1873, joined the Society in 1912. As a member of the staff of Lloyd's Bank, he was several times transferred from one part of England to another, and thus had an opportunity of pursuing his entomological studies in Southern, Central and Northern counties. Contrary to the all-too-frequent selection of Coleoptera and Lepidoptera as favourites, he gave preference to the parasitic Hymenoptera of Great Britain. But he was well versed in many groups of insects and also took an interest in other classes of animals. He will gratefully be remembered for his achievements in the study of BRACONIDÆ.

It is of rare occurrence that the love for entomological or other scientific pursuits persists in a family through several generations, as was the case with the Fryer

family of Chatteris, Cambs. F. H. FRYER, born in 1854, was one of that series. He was much interested in the fauna of Cambridgeshire and Huntingdonshire and collected especially Coleoptera and Lepidoptera, and to a less extent Rhynchota.

G. C. DUDGEON, who became a Fellow in 1894, spent a large part of his life in India as a tea-planter. His entomological activities while out in India were directed towards Lepidoptera, which he collected, observed and bred assiduously, being especially interested in the life-histories of the species. Among his various contributions to our knowledge of the Indian Lepidoptera the most important is the "Catalogue of the Heterocera of Sikkim and Bhutan," which appeared in Vols. XI to XVI of the *J. Bombay Nat. Hist. Soc.*

F. V. THEOBALD, professor of Economic Zoology at the South-eastern Agricultural College, Wye, Kent, who died in March 1930, began his entomological career as a Dipterist and soon became known in wider scientific circles. His large work on the CULICIDAE of the World is that of a pioneer who had to overcome great difficulties and for that reason was liable to errors which the successors for whom the path had been cleared could avoid. In 1910 he was appointed Economic Entomologist, and in that capacity did much work on plant-lice. Professor Theobald, who was elected a Fellow of the Society in 1910, was of a retiring disposition and did not often put in an appearance at the meetings of Entomologists; he attended, however, the Entomological Congress at Oxford (1912), where he read a paper on the Aphids of Cultivated Peas.

W. H. MILES, a Fellow since 1883, spent many years in India, where business interests called him. His connection with the tea-trade drew his attention to the insects which attack the tea-shrubs, and he took up the investigation into the life-histories of these pests. He died at the age of 67.

Ladies and Gentlemen, we will rise in memory of the Fellows of the Society who have passed away.

An International agreement about a division of labour in Nomenclature, according to which all questions concerning names in Entomology are to be referred to the International Committee on Entomological Nomenclature, has brought it home to me that we have no generally accepted definition of what is Entomology and, as is shown by the serious dispute which has arisen in the Commission on Zoological Nomenclature about the definition of a term employed in the Rules, the definition of Entomology, or in other words, an agreement as to which groups of Arthropod Invertebrates come under that term, would be of some practical importance. Linnaeus included the Crustaceans in the Insecta, and even at the Entomological Congress of Oxford in 1912 a paper was read by E. L. Bouvier on the early stages of some Decapod Crustaceans. But to give the word Entomology as extensive a meaning as that seems to be too generous, though a paper on the homology of certain organs in Crustaceans, Spiders, Hexapods, etc., might very well be accepted for publication by an Entomological Society or an Entomological periodical. On the



other hand, it is hardly advisable to restrict the term Entomology to the Hexapods, the insects in the modern sense, as such a restriction would leave the other non-crustacean Arthropods unattached. The Zoological Commission on Nomenclature holds the opinion that the names of the classes generally interpolated between Insecta and Crustacea concern the Entomological Committee and, as secretary of the International Committee on Entomological Nomenclature, I have provisionally concurred. But I quite see that for the sake of economy in space and expense, this Society may have to confine its library and its publications to Hexapoda, though perhaps not quite rigorously. So far as this Society is concerned, we may therefore define Entomology, or Entomozoology, as the science which treats of Insecta, an Entomologist being a person who studies insects, a definition rather different from what is in the mind of the *vulgus publicus*, which looks upon an Entomologist as a person who impales insects.

Entomological research consists of three branches of activity: (1) the collecting of facts, (2) the search for methods of application of these facts for economic and hygienic purposes, and (3) the study of the causes which have brought the facts into existence.

As I hope that some day this presidential chair will be occupied by one or the other of our fellows who are intimately versed in the methods and requirements of Applied Entomology and who are much better qualified than I am to speak on the subject, I shall abstain from mentioning that branch of science any further in this address.

The collecting and accumulating of facts and the speculative or explanatory side of Entomology concern us all very deeply, and every one of the fellows of this Society can lay claim to being part-expert in this or that direction. All studies in biology are based on specimens, dead or alive, entire or manipulated. The specimens may be looked upon as being the primary facts, and if they are preserved as well as possible in the state in which Nature has presented them to us, and indicate the circumstances in which we found them, such a properly labelled collection is a basic record and of high scientific value even if its owner has never published a line. The importance of well-labelled collections cannot be stressed enough, and as an intensive biological survey at public expense is still far off, the private collector should be encouraged as much as possible, the lack of collections impeding investigation.

The description and classification of the raw material amassed was for a long time the sole aim of the systematist, the speculation as to the origin of his species and their structures or colours being considered outside his sphere of work. The "being as it is" and the "functioning as it does" were the subjects of research. When, in 1896, Dr. Albert Günther had seen a paper in which I demonstrated the geographical variation of the genital armature of Lepidoptera and in which I drew certain conclusions as to the origin of specific distinctions, he surprised me very much by saying to me at Tring that I had gone over to biology and that he did not approve. I was not aware that I had stepped outside taxonomy, and felt much taken aback. The reason for that attitude was that in the opinion of many taxonomists speculation seemed premature, as we knew as yet too few of the actually existing species and very little about the life of the described species. If that argument had been correct at that time, it would be correct to-day; for we are still acquainted with

but a small percentage of the existing insects, as the harassed specialists know only too well. The ANTHRIBIDAE from the island of Java may be mentioned by way of illustration. In the catalogue issued last year 80 species are recorded as being

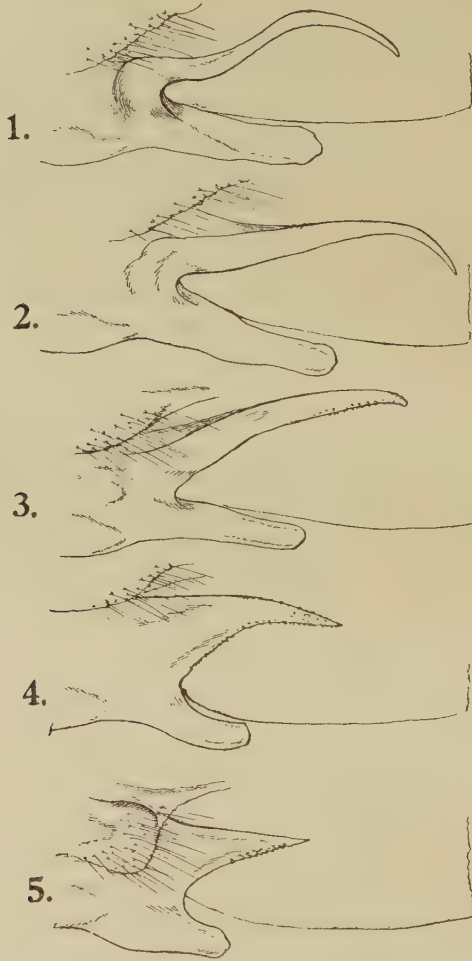


FIG. 1.—*Hyloicus pinastri pinastri*, L., 1758, from Germany : armature (harpe) of clasper of ♂; upper arm of fork very long and slender, subcylindrical.

FIG. 2.—*Hyloicus pinastri censis*, Jord., 1931, from the French Alps (type from La Grave) : upper arm of harpe long, less curved than in Central European specimens, proximally broader.

FIG. 3.—*Hyloicus pinastri medialis*, Jord., 1931, from Central France : upper prong shorter, straighter, distally denticulate, proximally at least as broad as in *H.p. censis*; ventral prong shorter than in the two previous subspecies.

FIG. 4.—*Hyloicus pinastri massiliensis*, Jord., 1931, from Marseilles : both prongs much shorter than in the three preceding subspecies, more compressed, the whole harpe proximally broader and flatter; upper prong denticulate.

FIG. 5.—*Hyloicus pinastri maurorum*, Jord., 1931, from Algeria and the Pyrenees (type from Hammam R'irha) : prongs still more reduced in length than in *H.p. massiliensis*, the harpe proximally very broad. This subspecies probably also inhabits Spain, whence I have not seen specimens.

For an account of these subspecies of *H. pinastri*, cf. Nov. Zool. Tring, **36**, 1931.

known from that island. Two collections received by me last summer more than double the number, about 50 of the additional species being new to science and awaiting description. There is indeed much to be discovered and many a weary description to be penned. But should that be a reason for the systematist to adopt the ultra-conservative attitude to which I have referred? On the contrary; the very fact of the existence of the amazingly large number of species which every capable collector sends home from the tropics and subtropics asks loudly for an explanation how nature has managed to produce this mass of different and yet in many ways similar insects. Every collection is food for thought and speculation, if contemplated with intelligence. One must look and think, not merely look. Every species being a microcosmos with its own mysteries, our mind is kept busy finding solutions of these riddles; we are not satisfied with the mere knowledge that there are secrets, but we wish to discover them and are ever ready to satisfy our craving for an explanation of a phenomenon by taking recourse to theories. A European Hawkmoth may be mentioned as a case in point. The 3 specimens of the Pine Hawkmoth you see reflected on the screen are from one district and illustrate the usual extent of individual variability. Since individuals from the same place can be as different as here shown, the two specimens, one from Germany and the other from Marseilles, now on the screen, do not arouse our curiosity, because they are practically alike in colouring. When I was asked early last year to express an opinion as to whether the specimens of the Pine Hawk from the Ussuri country in East Siberia differed from the Japanese subspecies, I looked at the preparations of genitalia in the Rothschild collection and incidentally examined an Algerian example of the Pine Hawk, suspecting nothing. I was surprised at what I saw and immediately investigated the other material received since Lord Rothschild and myself published our Revision of the SPHINGIDAE in 1903. The five sketches are taken from specimens from different districts and represent the armature on the inner surface of the clasper. In Central and Eastern Europe inclusive of Switzerland (Fig. 1) the two prongs of the fork are very long; the upper one is slender to near its base and is here twisted in a peculiar way characteristic of all males of that district. In the French Alps (Fig. 2) the upper process is less curved and proximally broader. In Central France (Fig. 3) we find a transition towards the next, which is from Marseilles (Fig. 4), and the fifth figure is taken from an Algerian example (Fig. 5), with which those from the Pyrenees agree. We have no Spanish specimens.

I have no doubt that the question which jumps to the fore in the mind of the Lepidopterists refers to the status of the British Pine Hawk, which has become more frequent of late. I have reasons for leaving that question as yet unanswered; besides, suspense emphasises a point. While looking at the drawings, one or the other of our Fellows will have arrived at a theory explaining the sequence of events which has produced this chain of geographical variations of the ♂ genital armature, and I venture to suggest that the theory spontaneously formed is something like this: the area of the Pine Hawkmoth became divided during the glacial period into a South-western district and a South-eastern one, where the species, isolated into two populations, developed into two subspecies, as is usually the case in animals thus isolated. With the retreat of the ice both subspecies spread northward and came into contact, amalgamating in the intermediate district and thus forming



intermediates between the extremes. Whether this is a true account of the history of the process, we will not discuss; I only brought this example forward in order to show how a purely taxonomic inquiry leads involuntarily to biological speculations.

Theories based on taxonomic and bionomic observations have their shortcomings, of which we are frequently reminded by workers in other branches of knowledge. When reading pronouncements by non-biologists on the constitution of the Cosmos and its working, I always recall with some amusement the dictum of a fellow-student, a mineralogist, who explained to me, with the fervour of youth and the insistence of an enthusiast, that the only branch of the Linnean Natural Sciences worth studying was Mineralogy, because this science was based on the exact methods of physics, chemistry and mathematics. As it happened, animate nature, which includes individuals that go in for Mineralogy, had the greater fascination for me. Though it is quite true that the variables of the biologist are a shaky basis for all-embracing theories on life, he need not feel discouraged on that account. The exact sciences are no more infallible in their theories than biology, and the history of philosophy is a concatenation of errors. Theoretical speculations serve as guides in research and assist in the advancement of knowledge even if they are erroneous. Those of us who are interested in gardening know that some of the best plants could not successfully be grown until the moraine was invented, that heap of old rubble apparently no good for anything. The scrap-heap of theories is a moraine from which come forth vigorous new lines of thought. It is from this point of view we should look upon theories that run counter to our experiences or our preferences. The philosopher who views the activities of taxonomists from afar, however, has some reason for wondering at our ways, for there is something contradictory in our method of dealing with species in classification according to relationship and the theory of descent on which we base the idea of this relationship.

The study of the mass of material available has proved the existence of an immense variability. Equality of individuals is a wish created by sentiment, not a reality. No two specimens are seen to be alike in any organ of their body, and we are compelled to conclude therefore that this instability goes right down to the chromosomes and beyond. The organic world thus appears to be infinitely mouldable like a lump of clay. On the other hand, the taxonomist arrives everywhere at the fact that there are limits to the malleability and that there is a fixity in the organisms. In spite of the known variability, we describe and catalogue the species as if they were still the Linnean created constants. *Papilio machaon* is for the Lepidopterist an entity opposed to all other European insects. There is for the Entomologist in every species of his special group something that shuts it off from the rest. The species is encircled by a constant and varies in all directions within this circle. The species, therefore, is a variable constant, a contradiction in terms, our treatment of which must of necessity also be contradictory in some way.

There are two taxonomic methods of dealing with this variable constant. For the purpose of reducing chaos to order, the scientist ascertains the constants which separate one species from the other; and on the other hand, he studies the variables, either for their own sake as in the conservative method of taxonomy, or with a view to discovering their bearing on the origin of the specific constants.

This latter aspect of the variables has provided a sort of "leit-motif" in my

taxonomic activity during the last thirty-five years, a goodly slice out of my life, and for that reason it seems to me appropriate that I should demonstrate to-night by means of one species up to which point of the road indicated taxonomy leads us. The survey of the variation of a species incidentally throws into relief our ignorance and establishes a kind of programme for further work. I have selected the simple history of a small European creature related to the one with which David compared himself in self-abasement when he shouted from the hill-top to Saul: "Whom does the king pursue? A dead dog? A mere flea?" The mere fleas have since acquired quite a different social position among insects. While the Talmud considered them to be put into the world as a punishment for our sins, which may be—they no longer bite me—a modern rabbinist would perhaps say that they were

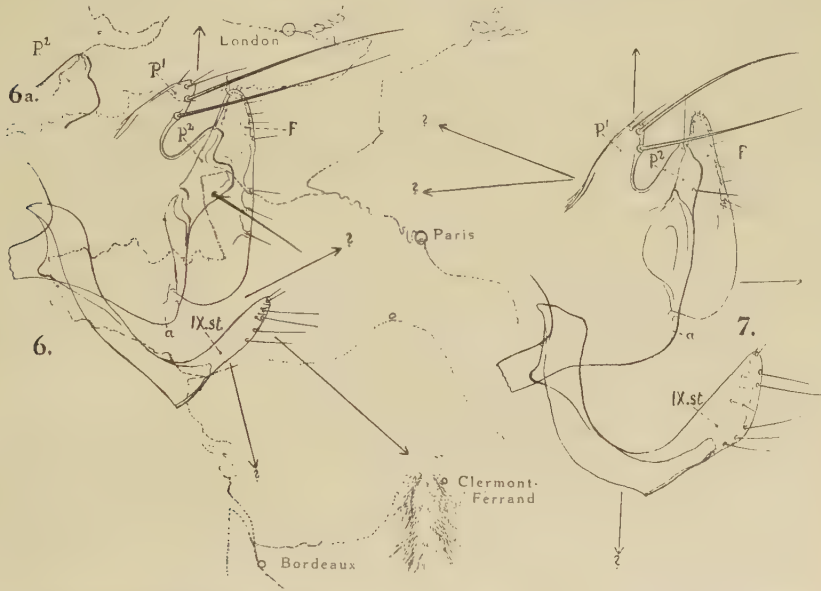


FIG 6.—*Ctenophthalmus agyrtus celticus*, Jord. & Roths., 1922, from England; ♂-genitalia.

FIG. 6a.—*Ctenophthalmus agyrtus celticus*, Jord. & Roths., 1922, figs. 6 and 6a illustrating the variability of process P.

FIG. 7.—*Ctenophthalmus agyrtus agyrtus*, Heller, 1896, from Meurthe-et-Moselle.

agents for keeping the population within bounds by means of transmitting diseases. One of these fleas we will put to other use. The Mouse-flea, *Ctenophthalmus agyrtus*, is an excellent subject for study, because it is widely distributed in Europe, is easily obtained and easily bred and varies geographically. There is no hedge, coppice or meadow in Europe where this flea does not occur, on voles and mice and occasionally even on moles and shrews. There is no lack of material at large; for instance, in a nest of the long-tailed field-mouse which I accidentally unearthed in my garden a fortnight ago, I found, besides the small blind Sylphid beetle, *Leptinus testaceus*, and a multitude of mites and dipterous larvae, four species of fleas, *Ctenophthalmus agyrtus* being represented by several dozen specimens. The geographical differences in this species are almost entirely confined to the male genital organs, to which alone I shall here refer, and as they have already been described

elsewhere, I can let the figures speak for themselves as regards the details in structure by which the various races are distinguished. The sketches are arranged geographically, the faint dotted outlines of coasts and rivers being added as an aid to our memory. The arrows indicate the direction of distribution, and the question-mark at the head of an arrow means that we do not yet know how far the subspecies is distributed in that direction. For our purposes it is sufficient to restrict the survey to Central and Western Europe. Great Britain, Ireland and the west of France are inhabited by a race (Figs. 6 and 6a) which is easily recognised, contrasting in the small size of the ventral arm of the ninth sternite (IX. st.) with all other races of the species, and also in the different development of the angle *a* of the clasper, as well as in other details. We know the subspecies also from Brittany and the northern Auvergne, and it is probable that it extends in the west down to Bordeaux or beyond, possibly inhabiting there at least that area which belonged to the English king at the time of the Black Prince. Considering the size and diversity of the range, from the Shetlands to the Auvergne, and the fact that the western portion of the channel between Ireland, Cornwall and Brittany has existed at least since the Tertiary epoch, it is most surprising that the race has not split up into a British one and a French one. It is hardly an acceptable suggestion that the isolation has been counteracted by a frequent immigration across the channel; if such an exchange has taken place or occurs occasionally, it would take ages before it could make its influence felt in the remoter districts of the range. We must therefore regard it as a fact that no visible modification (geographically speaking) has taken place in the race in all those ages because this subspecies, in spite of individual variability, resists further change. It is very unfortunate that no collecting of mouse-fleas has been done in Northern France east of Brittany. In Eastern France, in the department of Meurthe-et-Moselle, the Central European subspecies occurs, a specimen from that district being represented by Fig. 7. A whole series of questions arise: Where do the two subspecies meet? Is it somewhere in Normandy or in Seine Inférieure or further east on the battle-fields? Do they peaceably amalgamate when they come into contact, or have they acquired such an aversion towards each other that they clash and keep strictly apart though living side by side, as in many cases of human races? The territory in question is before our door, so to speak, but where is the collector who alone can help us? Though a guess is of no great value, I venture to predict that the Central European race will be found to go as far as Calais, the coast of the channel being a faunistic boundary from postglacial times, and that the western race extends across Normandy. The second subspecies occupies an even larger area, being known to occur from the Lake of Geneva to Norway and Iceland (probably introduced on this island in recent times) and from Eastern France to Eastern Germany, the range overlapping that of the Russo-Hungarian race in Saxony and probably in Silesia. In turning to the Alps—where many of you would like to be this moment, no doubt, instead of having to listen to me—we find a most interesting distribution of races. Switzerland is the familiar happy hunting ground of the Entomologist, whence we have considerable material of the species under consideration, but not nearly enough. *Ctenophthalmus agyrtes* is found from low altitudes to far above the tree line, probably occurring up to the glaciers in all places where the voles find sufficient soil in which to make their



burrows and vegetation on which to feed. But the vertical distribution makes no difference, the flea remaining the same whether obtained at 200 m. or 2000 m. The variation in a horizontal direction, however, is more definite and more simple than for instance in the Butterflies. From Eastern France via Alsace and the Swiss Jura to Vevey on the Lake of Geneva and to the Bernese Oberland we meet with the Central European subspecies, our Fig. 8 representing a specimen from Lausanne. Proceeding beyond Montreux up the Rhône, we find a subspecies (Fig. 9) the range of which includes the Alps from Zermatt to the French Riviera and probably extends to the western spurs of the St. Gotthard; on the north side of the Rhône Valley we have collected it at Bex-les-Bains. In the Engadine and near Zürich a

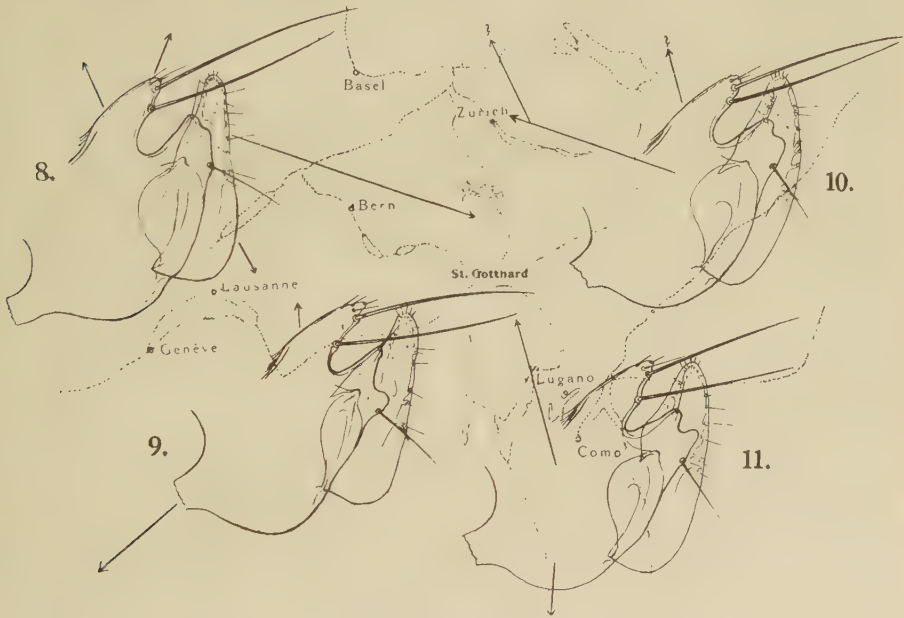


FIG. 8.—*Ctenophthalmus agyrtes agyrtes*, Heller, 1896, from Lausanne.

FIG. 9.—*Ctenophthalmus agyrtes provincialis*, Roths., 1910, from Zermatt.

FIG. 10.—*Ctenophthalmus agyrtes oreadis*, Jord. & Roths., 1920, from the Upper Engadine.

FIG. 11.—*Ctenophthalmus agyrtes verbanus*, Jord. & Roths., 1920, from the Tessin.

further subspecies is found which probably occupies all Eastern Switzerland and may reach into Bavaria (Fig. 10); and south of the divide, in the Canton of Ticino, we obtained another race (Fig. 11) similar to the Engadine one, but constantly distinguishable in the considerable series collected by the Hon. N. Charles Rothschild and myself at Locarno, Fusio, Bellinzona, etc.; this subspecies also occurs at Florence. The distribution of these four races found in Switzerland seems to head in every case towards the St. Gotthard, and it is quite likely that some or all the subspecies come into contact in that mountain massif. We have no material from the St. Gotthard; the nearest place where I have trapped being Goeschenen. The St. Gotthard district is a fortified area, and in such districts collecting is not always comfortable. Though the Swiss soldiers are amiable civilians and probably would

not be too hard on an Entomologist, it would be advisable to get permission beforehand; an experience in the Canton Vaud, where I was fined 10 francs for putting out mouse-traps, has taught me to beware of authorities. The absence of material from the St. Gotthard is distressing; one does not find many districts where one can make observations on three or four subspecies or, at any rate, where one can collect them.

The variation as here illustrated was discovered by Bates from specimens collected on the Lower, Middle and Upper Amazons, that is, in districts far distant from each other; and Wallace recognised the phenomenon on the islands of the Malay Archipelago. In both cases the areas were as disconnected as the subspecies observed in them. *Ctenophthalmus agyrtes*, on the contrary, has a distribution in Europe even more continuous than that of the Dandelion; there are no geographical barriers between the subspecies of *Ct. agyrtes*, nevertheless these races are as well-differentiated as if they were insular forms. They evidently hail from the time when Europe was not yet a continuous mass of land and have come into contact when their differences were already well established. In the absence of adequate collections from any of the contact areas, it is fortunate that the Swiss fauna has provided us with specimens which throw some light on the behaviour of subspecies towards each other. You are probably aware that some taxonomists consider two geographical forms to be specifically distinct if they occur together anywhere without amalgamating, while other taxonomists treat as subspecies all forms which are manifestly modifications of the same unit, whether their ranges overlap or not. I am inclined to adhere for practical reasons to the former method of treatment, but know that each case must be judged on its merits. Now, in the Swiss mountains, at Zermatt and in the Engadine, I collected a small number of specimens which do not belong to the race of those districts, but are like specimens from the Austrian and Italian Tyrol, and in the Bernese Oberland the Engadine race has been found as a rarity among the native race. How did the specimens get there and what is their status in these localities which are already occupied each by a special race of *Ctenophthalmus agyrtes*? We know from published reports on the chief transmitter of bubonic plague in India, the rat-flea *Xenopsylla cheopis*, Roths., 1903, that it is now and again imported into Ceylon with shipments of grain from the Punjab, and we may therefore conclude that mice and their fleas are occasionally conveyed in produce from one place to another in the Alps. One might also think in this connection of the arduous mountaineers who climb one peak after another; but they can hardly be held responsible for the distribution of this kind of flea. Mice, however, are likewise known to have the "wanderlust" and to possess great powers of overcoming obstacles, reaching, for instance, Alpine huts surrounded by glaciers. Whatever were the means by which the intruders reached the territories of established subspecies, the fact is the same: they are there, are not modified and are not swamped out of existence, interbreeding evidently not taking place or being of rare occurrence. The case requires further investigation; but it clearly teaches us this lesson that one must not expect a quick reaction if specimens of one subspecies are introduced into the environment of another. Whether an amalgamation will take place in the course of time, or whether this relatively recent immigration will lead to the development of a population which remains independent of the older

population, the taxonomist as such has no means of ascertaining. In experimental biology, however, one might make an attempt at solving the problem. There is a further lesson to be learned from these accidental immigrants at Zermatt, the Engadine and the Oberland, a lesson which bears on the question of the origin of the morphological and physiological barriers that keep the subspecies of *Ct. agyrtes* apart whenever, and presumably wherever, they come into contact with each other. Somebody not well acquainted with the results of the taxonomic study of variation might assume that the subspecies of the various countries are unchanged, true-breeding strains of the parent species which have become isolated. Far from it. Such strains would freely interbreed with each other and with the parent form, remaining true only if kept separate by an external barrier. Moreover, the territory-linked forms we refer to as subspecies have acquired distinctions of their own, which question has not been touched in the otherwise brilliant and ingenious experiments in genetics. In all groups of insects—and practically in all classes of animals—subspecific characters and territory go hand in hand; one need only look at a geographically arranged collection to perceive this combination. Is the combination that of cause and effect? Observing geographical variation to occur in nearly every widespread species and finding all gradations in the quantity of difference, I am quite ready to answer the question in the affirmative: the subspecific characters are produced by a factor or a combination of factors in the environment acting upon and altering the nature of the population which has come into existence in the newly occupied territory. This being an opinion arrived at in my taxonomic researches, I was most interested to find that *Ct. agyrtes* offered a severe criticism, which appeared somewhat disturbing at first sight. Let us look at the possible factors of evolution in the environment and see what *Ct. agyrtes* has to say about them.

The flea being a parasite one might assume that a change of host would exercise some influence. But *Ct. agyrtes* flourishes equally well in any territory on at least three different hosts belonging to three genera and two families, the Bankvole, the Short-tailed Fieldvole and the Long-tailed Fieldmouse, the flea remaining the same on all three.

Being a small insect, and its subspecific distinctions microscopic, the selective influence of enemies is likewise excluded as a modifying factor, there being no enemy that could perceive the differences.

As a dweller in the ground, in the warm nest of the host and in its fur, this blind flea is independent of light and temperature obtaining above ground.

Differences in geological formations, humidity and barometric pressure do not affect a subspecies which ranges from the North Sea and the Baltic to the heights of the Alps, or from the Shetlands to the Auvergne, or from the Riviera to Zermatt.

In fact, the large territory of each subspecies of *Ct. agyrtes* is so varied that every external factor we can think of must be negatived.

However, if every factor in the environment is rejected, how have the subspecies come into existence? Have the wee little beasties been suddenly created each in its territory independently of the environment? This line of thought seems to be quite logical; but are the conclusions correct? In dealing with animate nature, logic is a bad guide. Even if the premises are correct, it is yet wrong to say the results in a case not yet tested must be such and such, and we ought to say that it



will very likely be such and such, being always prepared that nature will just *not* do what we expected. Nature alive is nature illogical. Take the well-known argument against the reality of Mimicry : if it is of such advantage to one species to be mimetic, why are not all the species related to it likewise mimetic ? Quite a logical question, on a par with the one : why do not all squirrels have parachutes, if this means of locomotion is of advantage to the Flying Squirrel ? And so on. Nature is not a factory turning out preconceived machines, but is as erratic as any individual artist swayed by the mood of the moment. Determinism, predestination and suchlike concepts are postulates of logic, remote from the realities of living nature. In biology your logical predictions may be all wrong. In what I termed above the criticism offered by *Ct. agyrtes* the expression "is excluded," and words to a like effect, have to be modified into "appears to be excluded"; for we cannot be positive about any factor without a thorough test by experiment. That is where the journey of the taxonomist ends. In order to advance further, the experiment with the living beings must take up the trail. Such an experimental inquiry into the origin of the subspecific distinctions should imitate as closely as possible the working methods by which nature has achieved the results; for we are concerned only with the ways of nature, not with those of a fancier of any kind, valuable and highly interesting though these may be in themselves. Fortunately this attitude is spreading, and still more fortunately there is already a laboratory in existence at Vienna in which all possible factors can be tested under due safeguards. I most sincerely wish Professor Przibram great and speedy success.

I am well aware that at my age it is wisest to have few desires and to expect little in order to avoid disappointments, which are not healthy. But there is this one point in biology which I should dearly love to see clearly demonstrated, not merely plausibly explained, in my lifetime, at least in the case of one of the millions of insects : which are the factors that have brought into existence the fixed characteristics of geographical subspecies ? If we have an answer to this question, the mystery of the origin of species is solved. Meanwhile, we must content ourselves with watching what is going on in the greatest biological laboratory, where free access is granted to all who are born into this world. Happy is the man who enters that open door to spend his life among the secret processes in Nature's workshop. I consider myself very fortunate in having found that door.

I will conclude with thanking you for having given me this opportunity of referring to questions which have been so largely instrumental in moulding my outlook on life.

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OF THE

## PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF LONDON

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